

# KIC 010549422

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010549422-01	OBS	No	0.606385	132.038414	159.4	1.563	10.0	11.3	2.33	8584	3.43	80694.98
010549422-02	OBS	No	0.718642	131.545390	130.6	6.460	8.1	13.0	2.33	8584	2.77	64341.95

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010549422-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
010549422-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—CENT_SATURATED

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

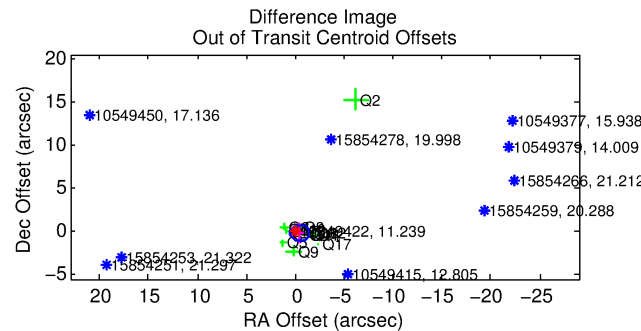
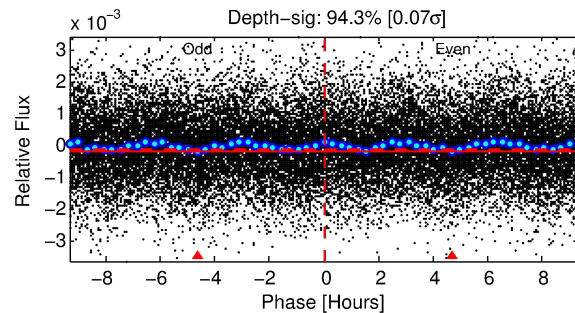
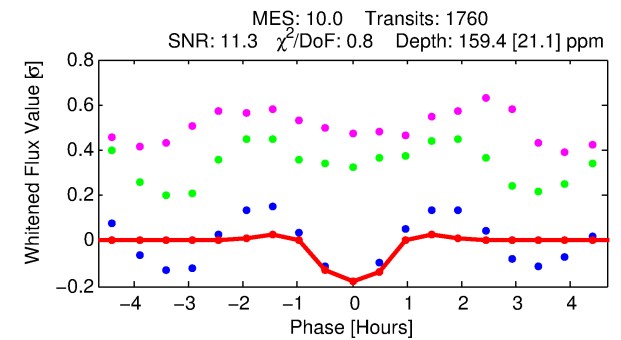
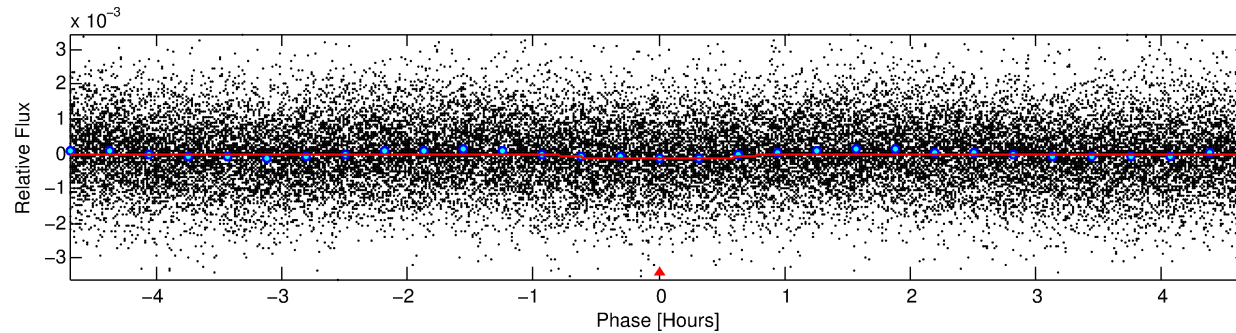
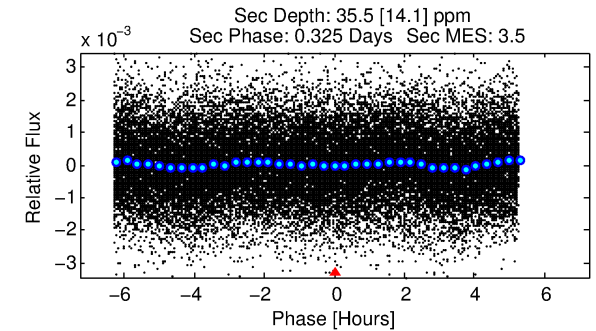
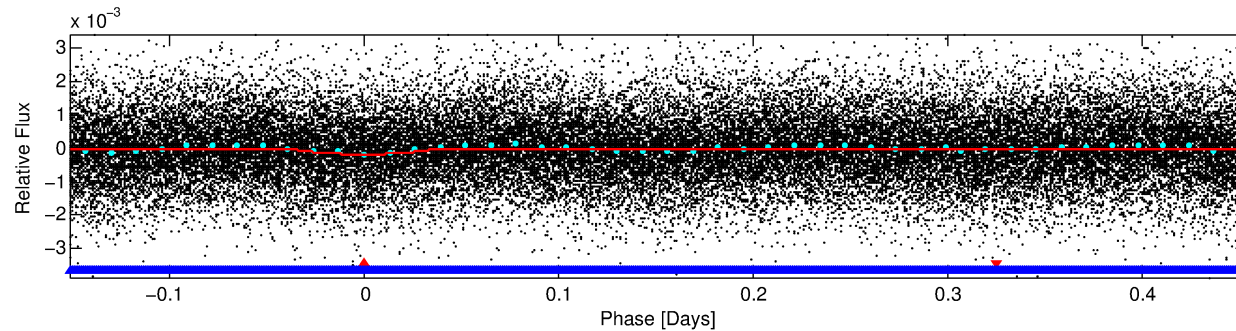
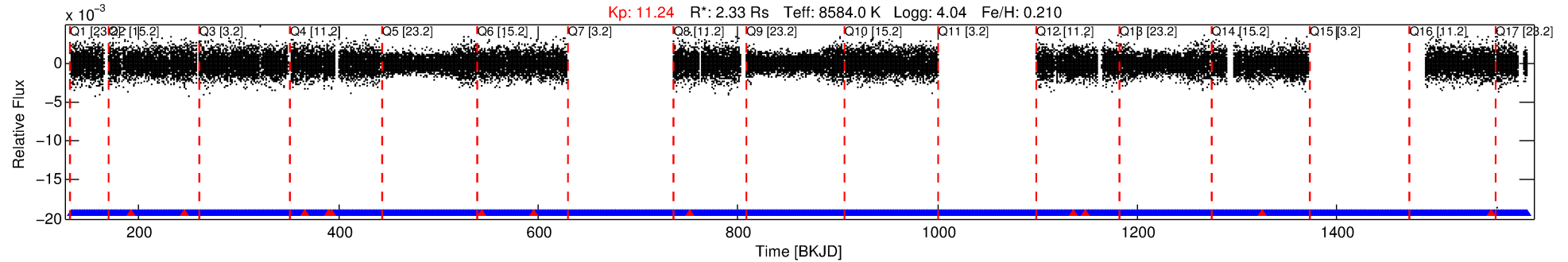
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010549422-01

No Significant Match Found

# DV One-Page Summary

KIC: 10549422 Candidate: 1 of 2 Period: 0.606 d



## DV Fit Results:

Period = 0.60638 [0.00001] d  
Epoch = 132.0384 [0.0019] BKJD  
Rp/R\* = 0.0134 [0.0073]  
a/R\* = 1.67 [3.81]  
b = 0.90 [0.76]  
Seff = 80694.98 [34377.52]  
Teq = 4298 [458] K  
Rp = 3.43 [2.19] Re  
a = 0.0181 [0.0050] AU  
Ag = 0.55 [0.66] [-0.68σ]  
Teffp = 5714 [1665] K [0.82σ]

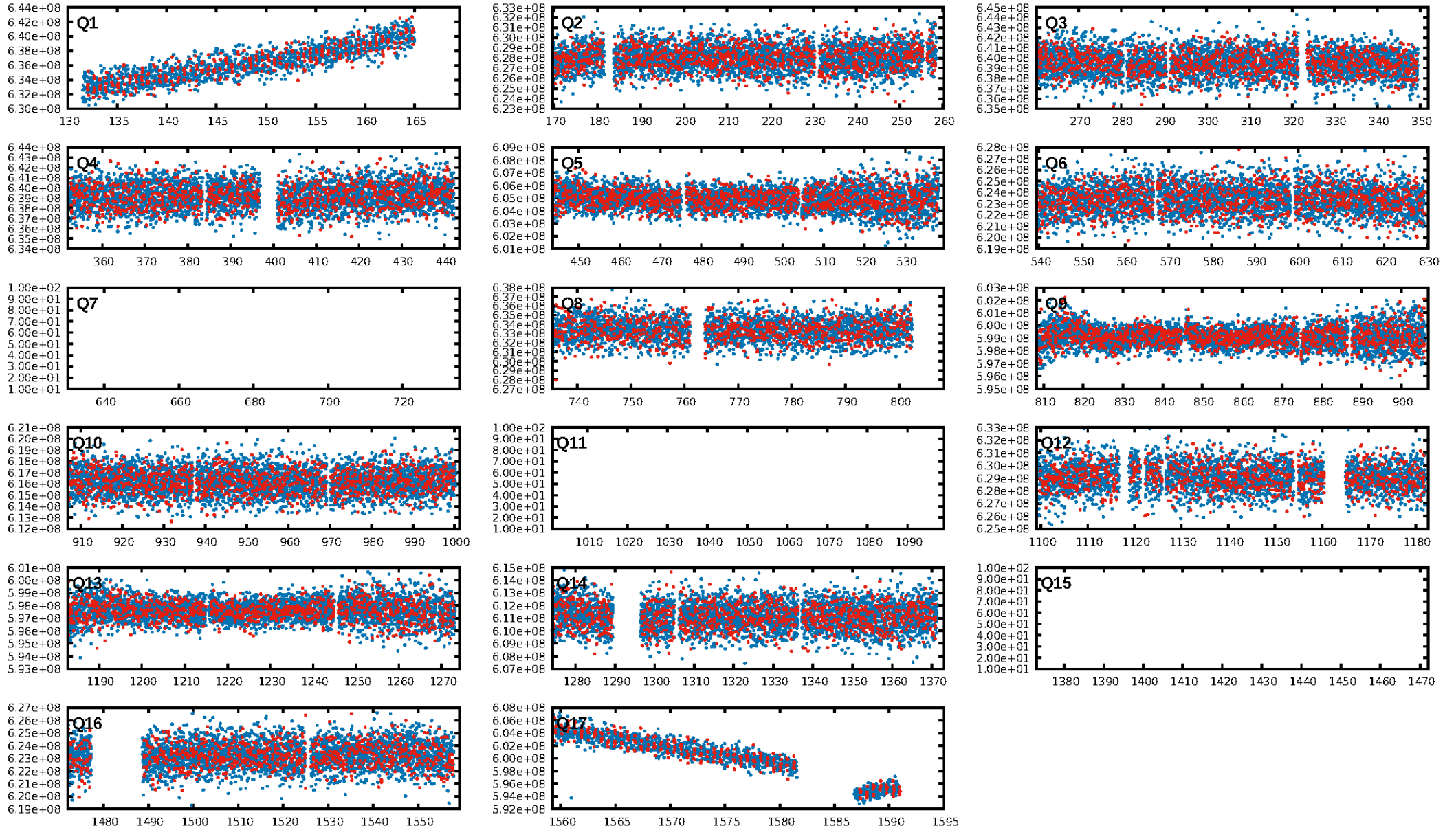
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 31.5% [0.41σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.99 [1649/1661]  
GhostDiagnostic-chr: 0.7083  
Centroid-sig: 0.0%  
Centroid-so: 0.485 arcsec [2.93σ]  
OotOffset-rm: 0.484 arcsec [1.53σ]  
KicOffset-rm: 1.266 arcsec [3.25σ]  
OotOffset-st: 4/1/4/5 [14]  
KicOffset-st: 4/1/4/5 [14]  
DiffImageQuality-fgm: 0.64 [9/14]  
DiffImageOverlap-fno: 0.00 [0/14]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 21:13:26 Z

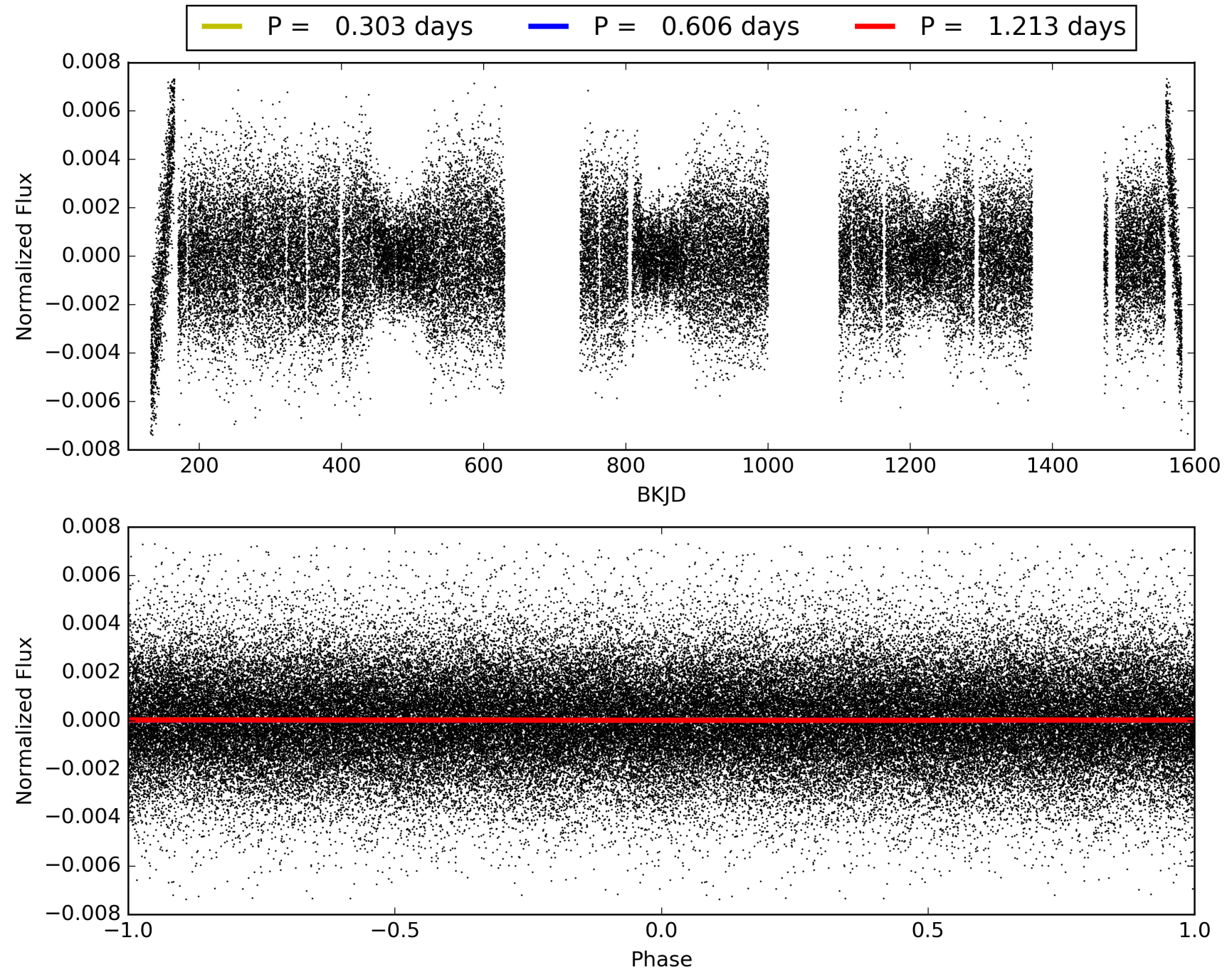
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010549422-01, PDC Light Curves



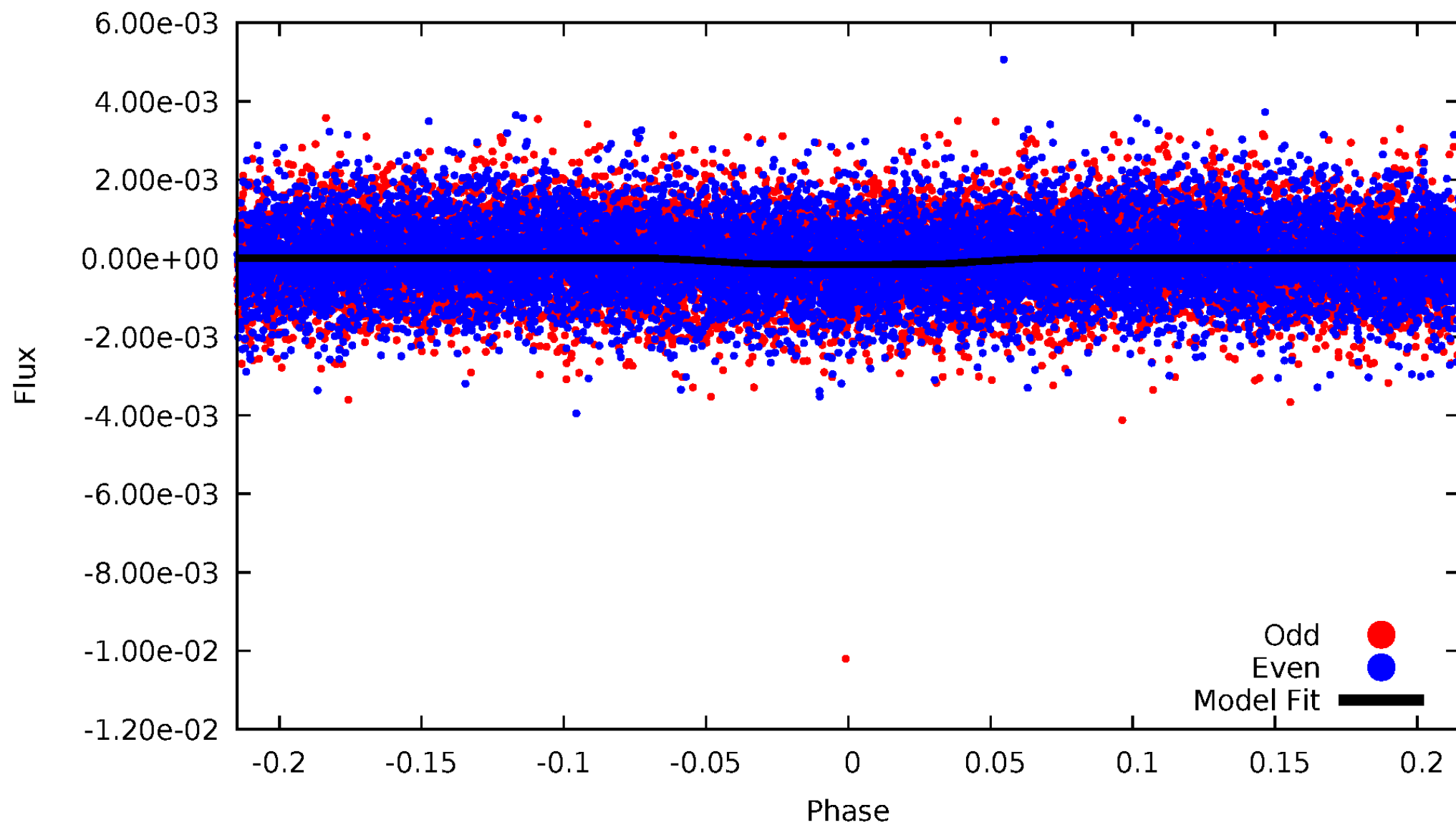


# TCE 010549422-01



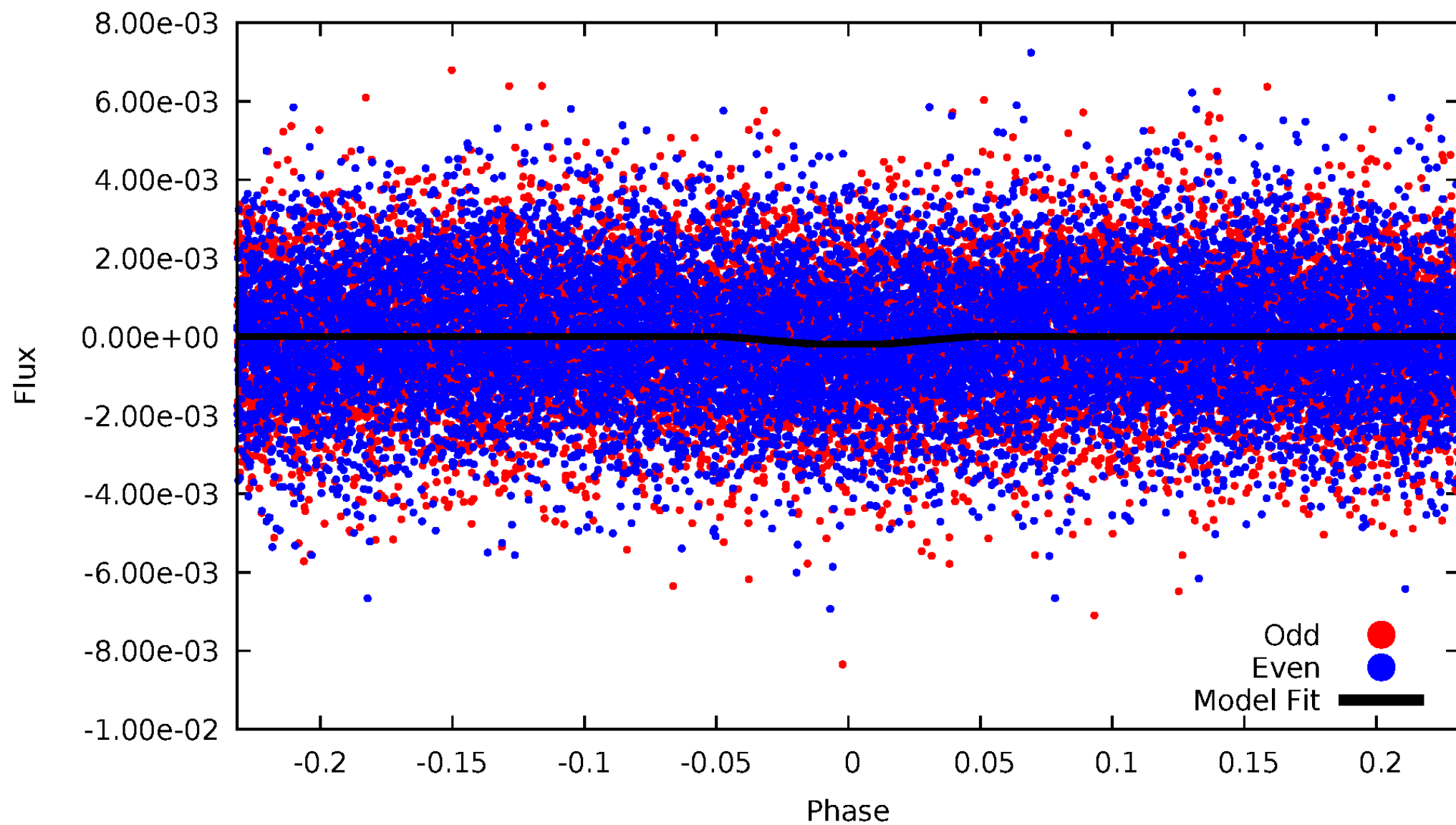
# DV Odd/Even

TCE 010549422-01



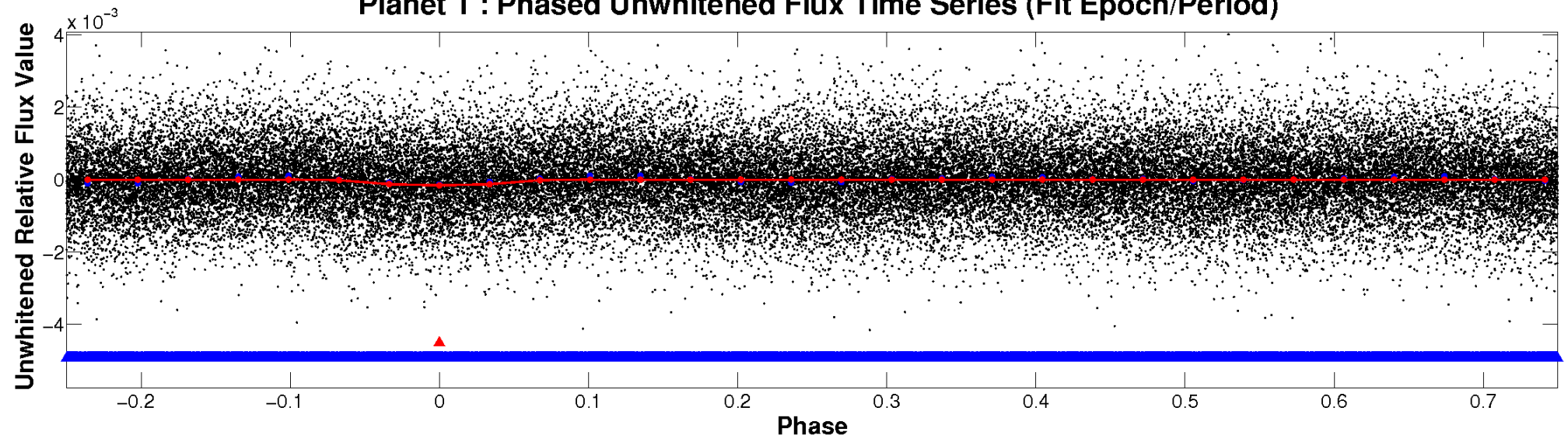
# ALT Odd/Even

TCE 010549422-01

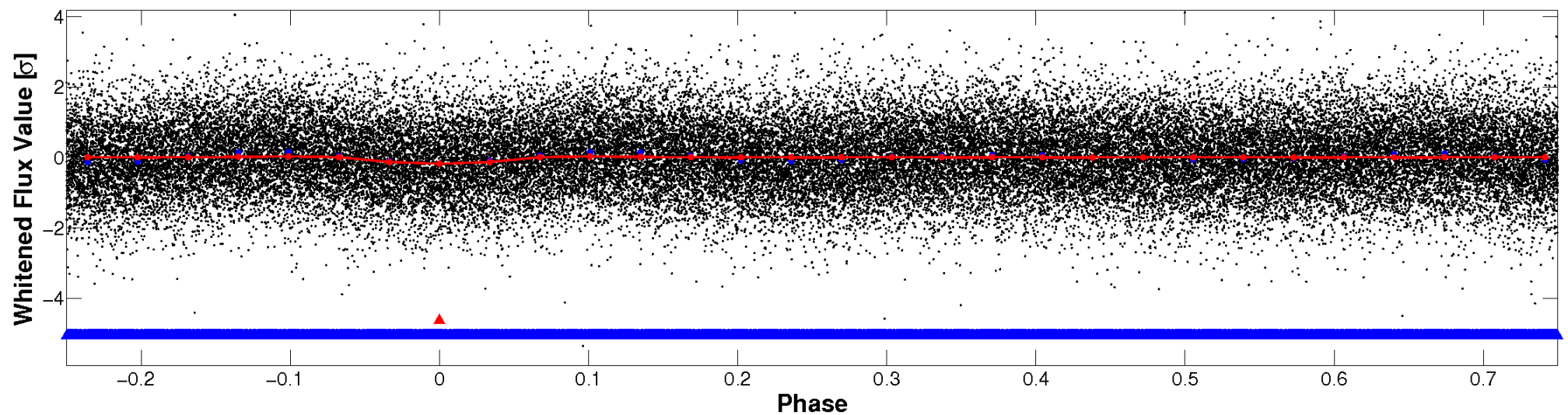


# Non-Whitened Vs. Whitened Light Curve

**Planet 1 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)**



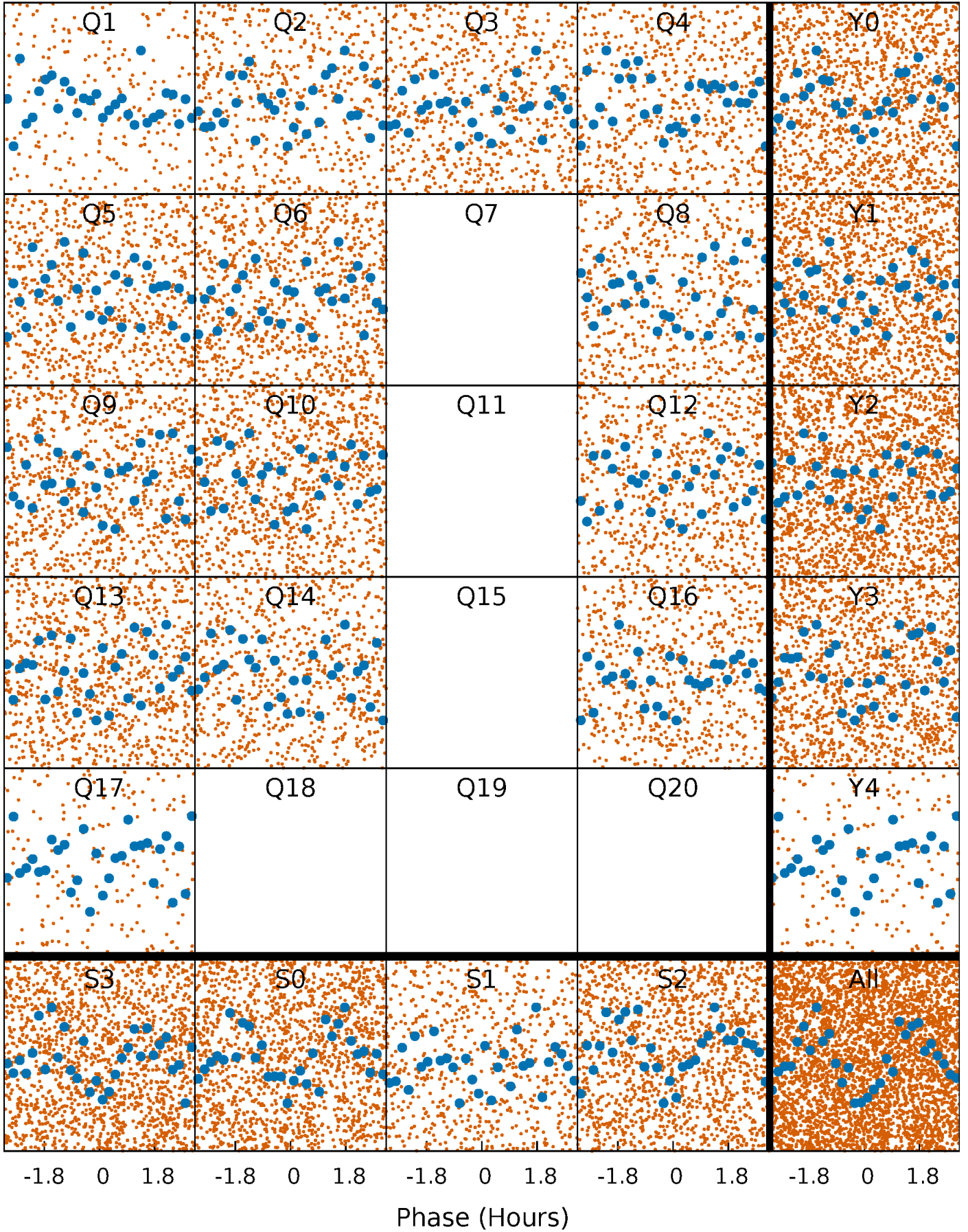
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

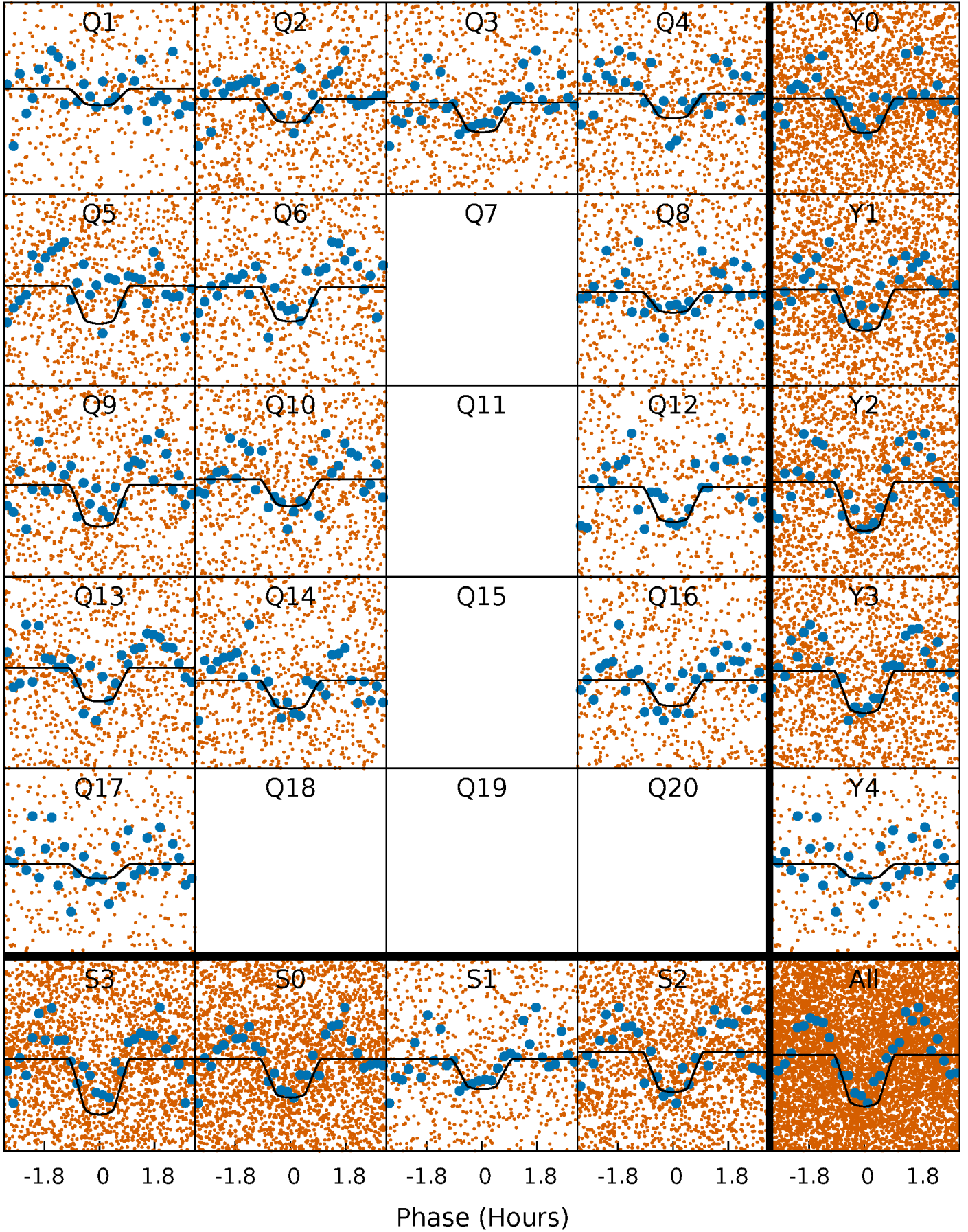
TCE 010549422-01   P= 0.606385 Days    $T_0=132.038414$  (BKJD)





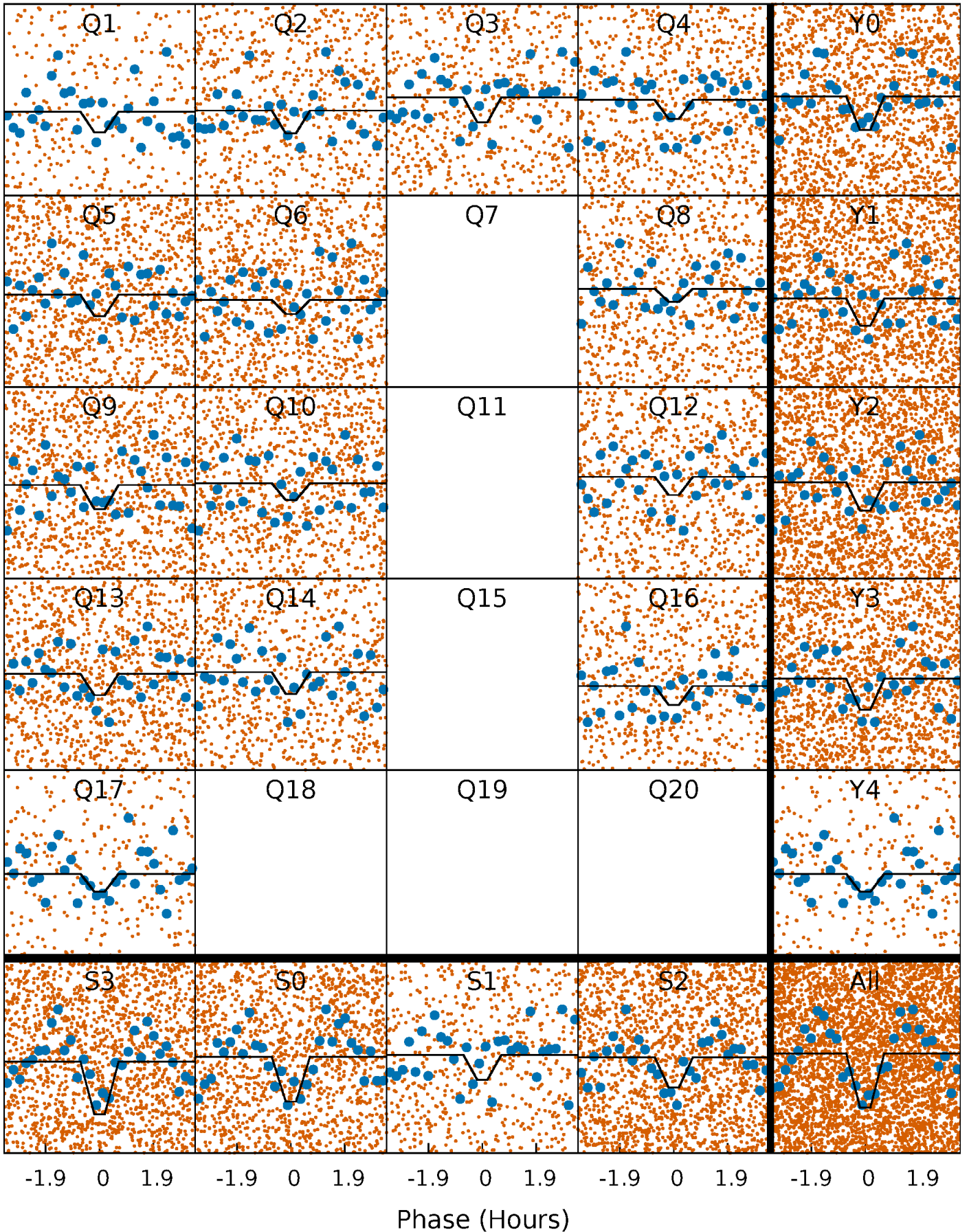
# DV Quarter-Phased Transit Curves

TCE 010549422-01 P= 0.606385 Days  $T_0=132.038414$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

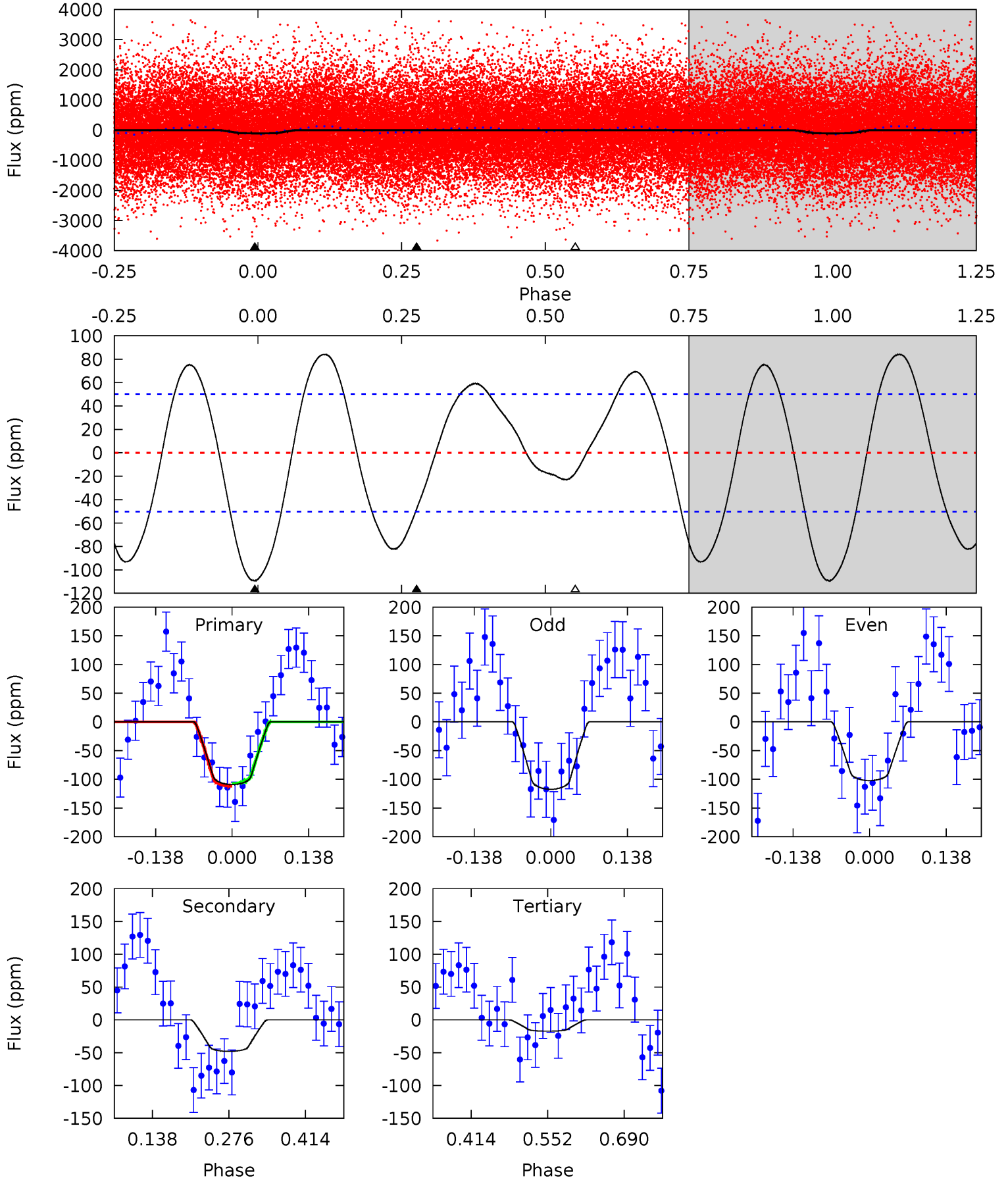
TCE 010549422-01   P= 0.606384 Days    $T_0=132.040580$  (BKJD)



# DV Model-Shift Uniqueness Test

010549422-01, P = 0.606385 Days, E = 131.432029 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.77	4.30	1.54	0	4.50	1.48	4.08	8.23	9.77	2.75	4.30	0.68	0.91	0.44	0.20

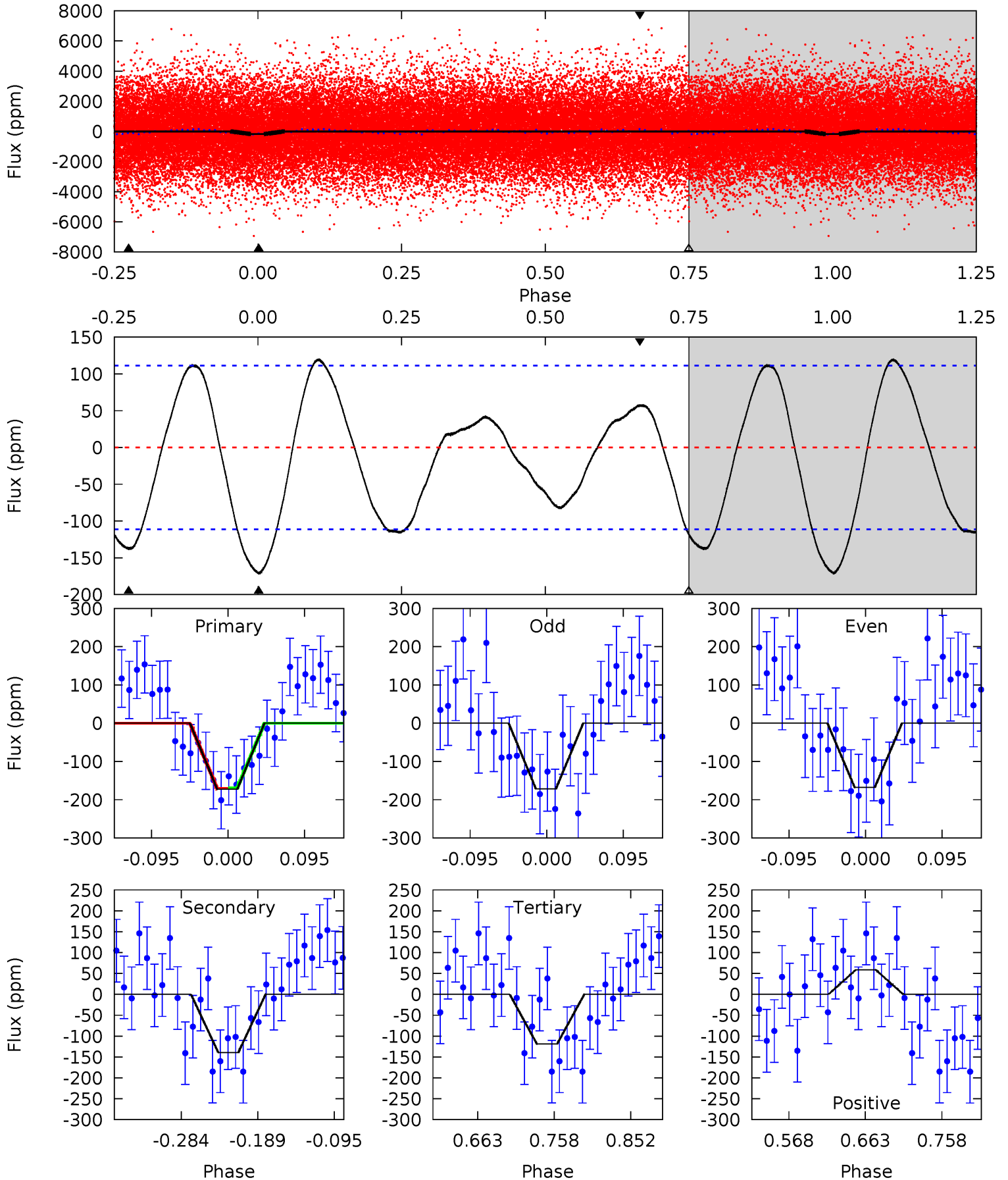




# Alt Model-Shift Uniqueness Test

010549422-01, P = 0.606384 Days, E = 131.434196 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.09	5.73	4.90	2.41	4.58	1.67	2.65	2.19	4.68	0.83	3.32	0.07	1.08	0.41	0.03





### Stellar Parameters For KIC 010549422

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$8584^{+240}_{-411}$	$4.036^{+0.148}_{-0.198}$	$0.210^{+0.150}_{-0.550}$	$2.335^{+0.802}_{-0.535}$	$2.159^{+0.330}_{-0.454}$	$0.239^{+0.190}_{-0.121}$
	+3%/-5%	+4%/-5%	+71%/-262%	+34%/-23%	+15%/-21%	+80%/-51%
Source	PHO54	PHO54	PHO54	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 010549422-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-48 \pm 11$	$3.44^{+1.98}_{-1.74}$	$5994^{+511}_{-436}$	$5100^{+3268}_{-8354}$	$0.680^{+2.255}_{-0.408}$
Alt.	$-139 \pm 24$	$3.65^{+1.93}_{-1.74}$	$6003^{+463}_{-413}$	$7215^{+4753}_{-1858}$	$1.845^{+5.039}_{-1.071}$

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature

$T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$

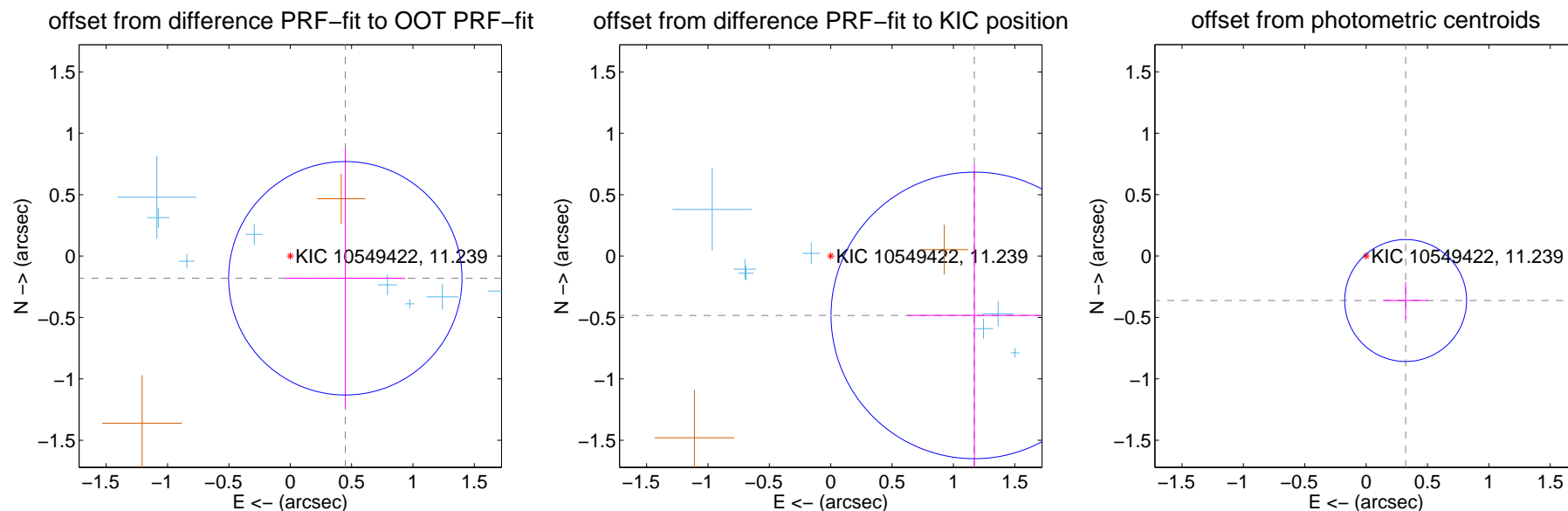
## DV Centroid Data

Supplemental centroid analysis for 010549422-01. **Kepler magnitude: 11.24.** Transit SNR 11.30

There are 9 quarters with good PRF difference image offsets

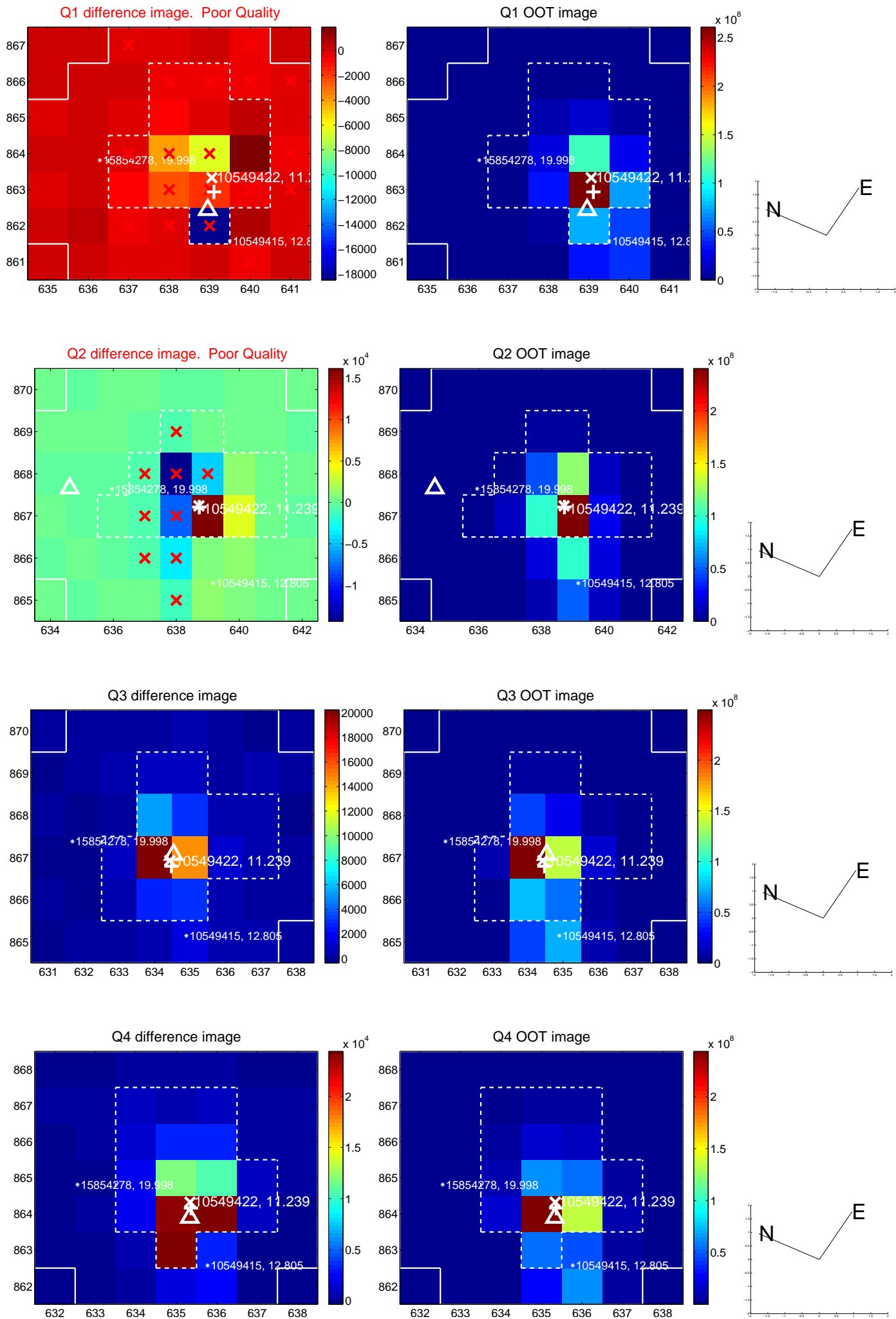
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.484 \pm 0.317$	1.53	$-0.449 \pm 0.487$	$-0.181 \pm 1.060$
PRF-fit source offset from KIC position	<b><math>1.266 \pm 0.389</math></b>	<b>3.25</b>	$-1.170 \pm 0.544$	$-0.483 \pm 1.226$
photometric centroid source offset	$0.48 \pm 0.17$	2.93	$-0.32 \pm 0.18$	$-0.36 \pm 0.15$

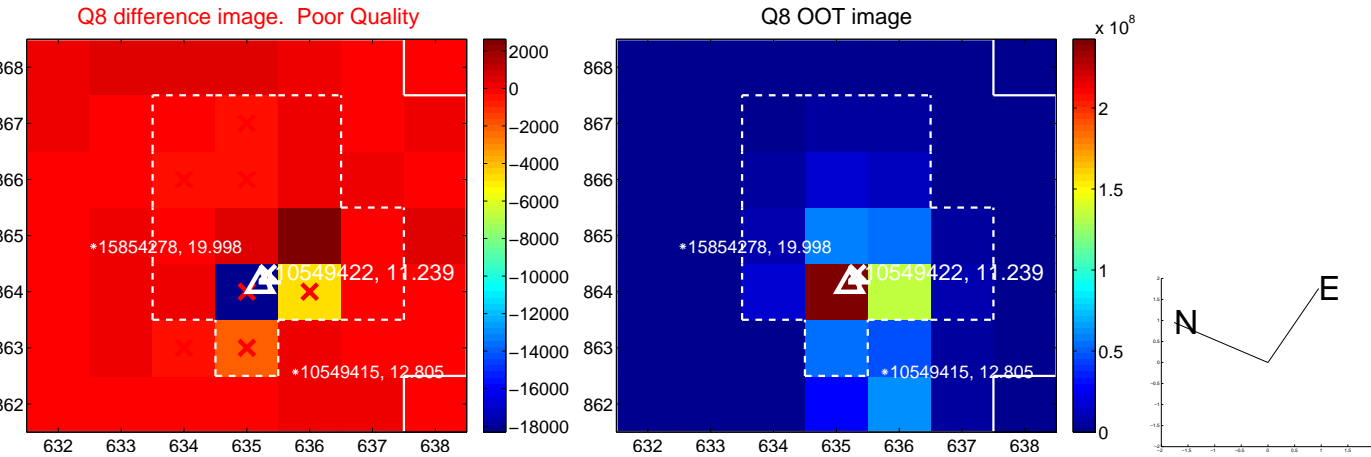
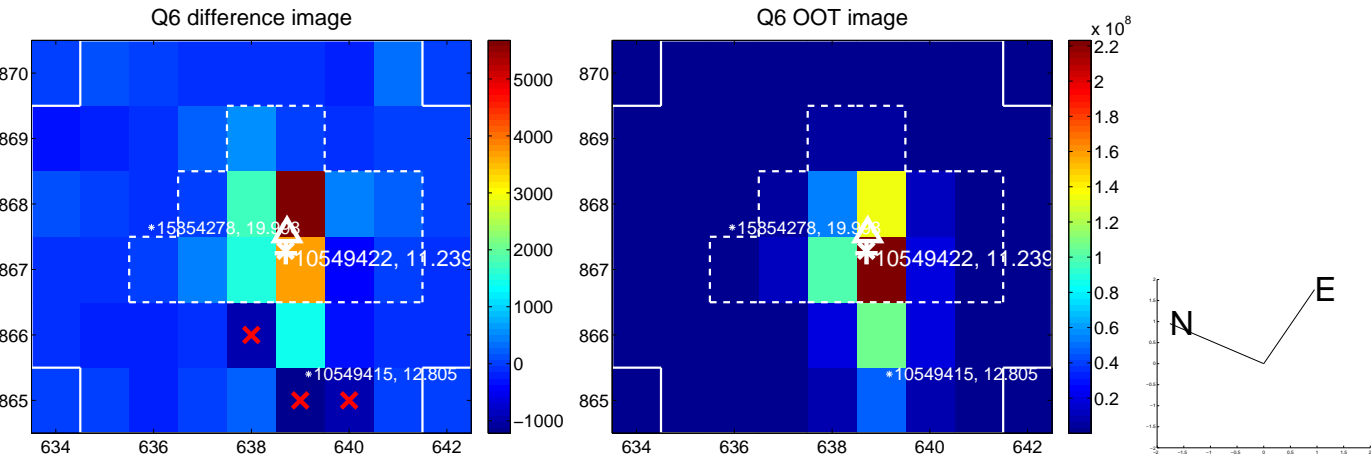
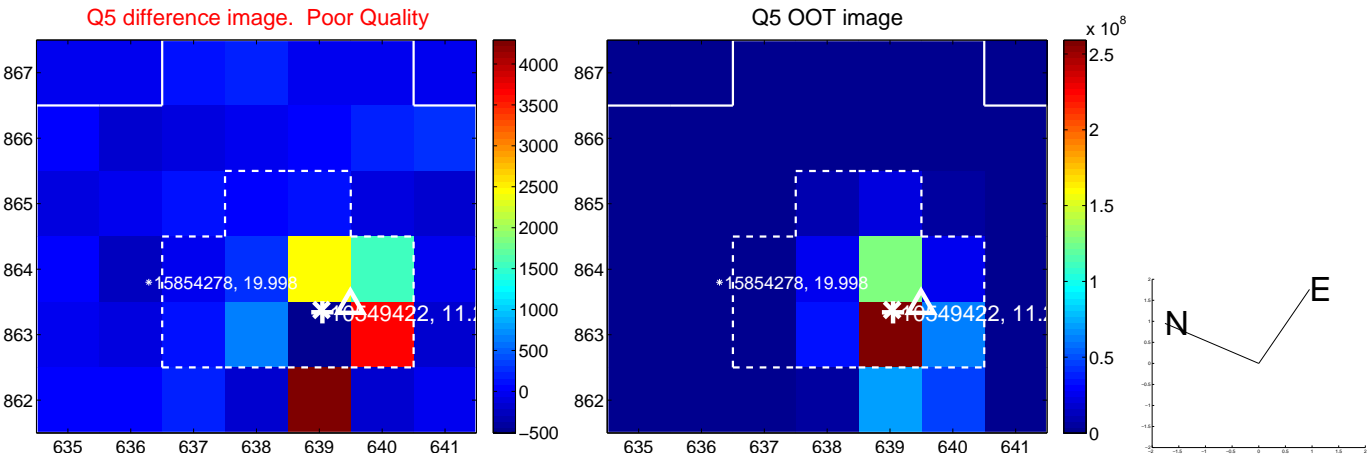


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

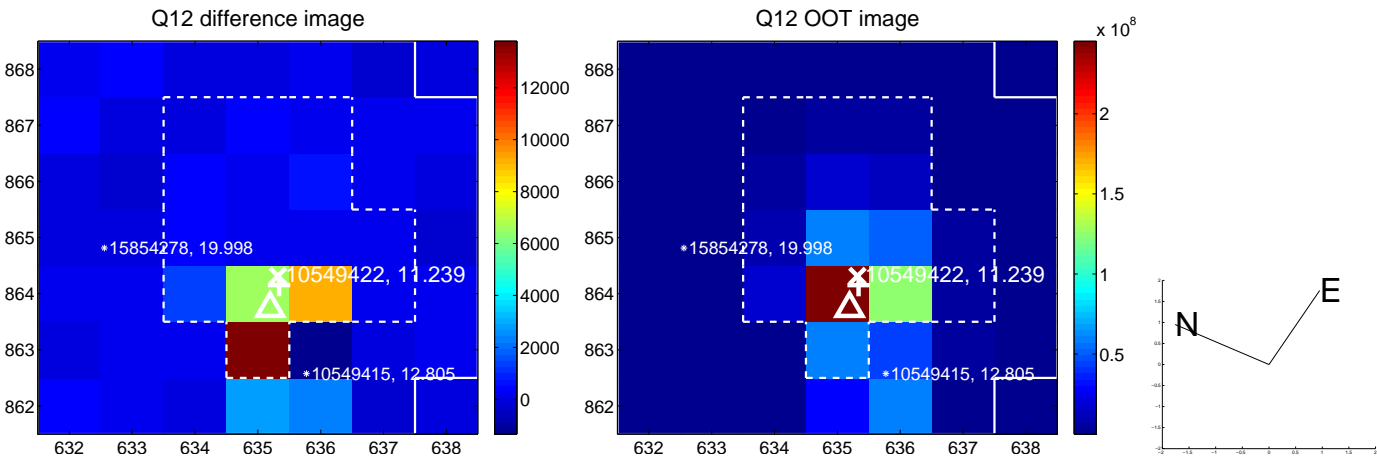
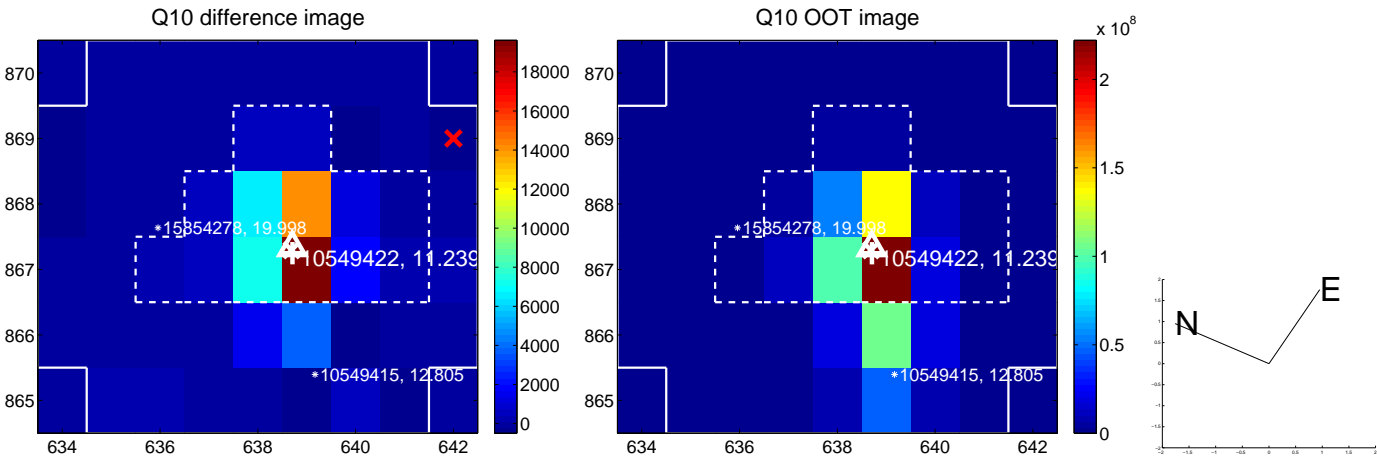
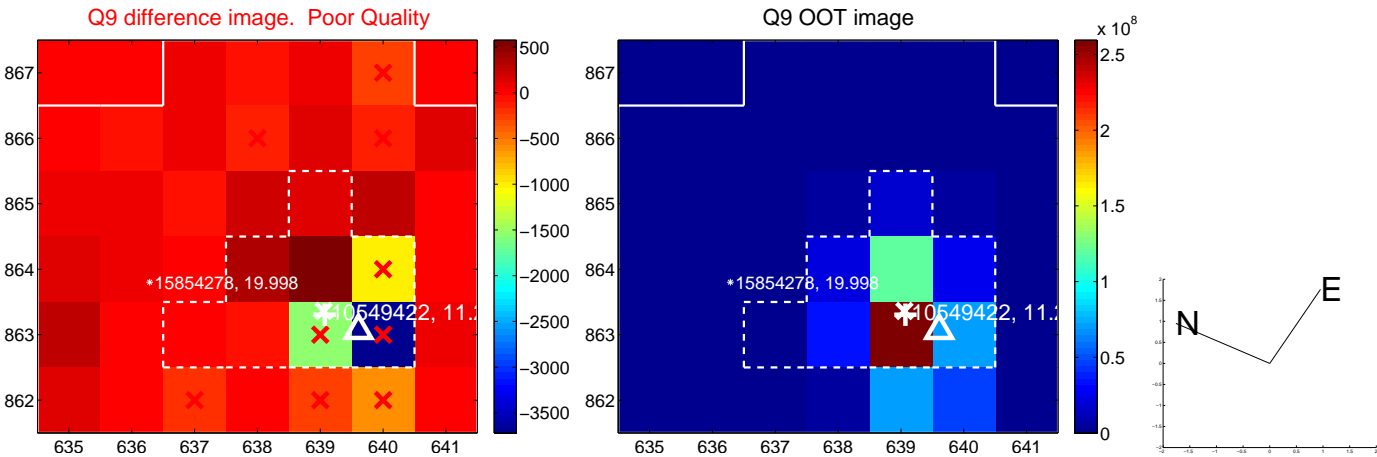


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

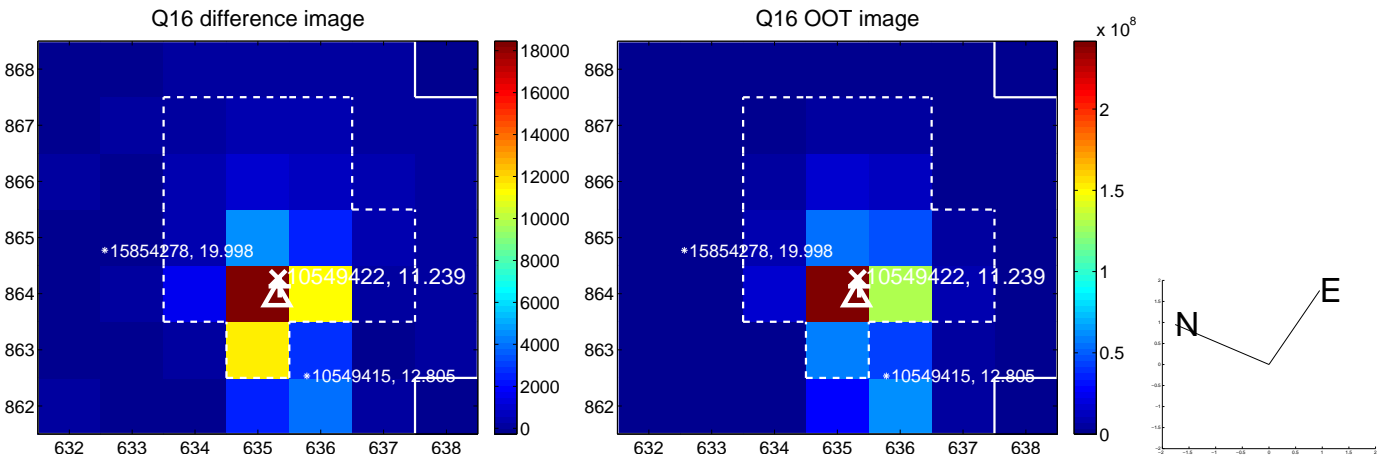
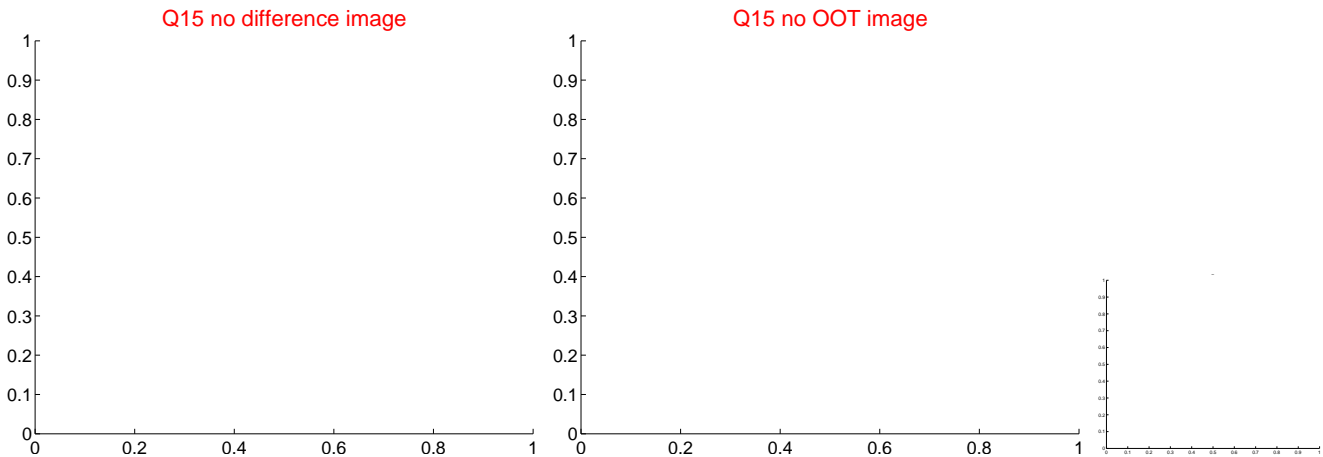
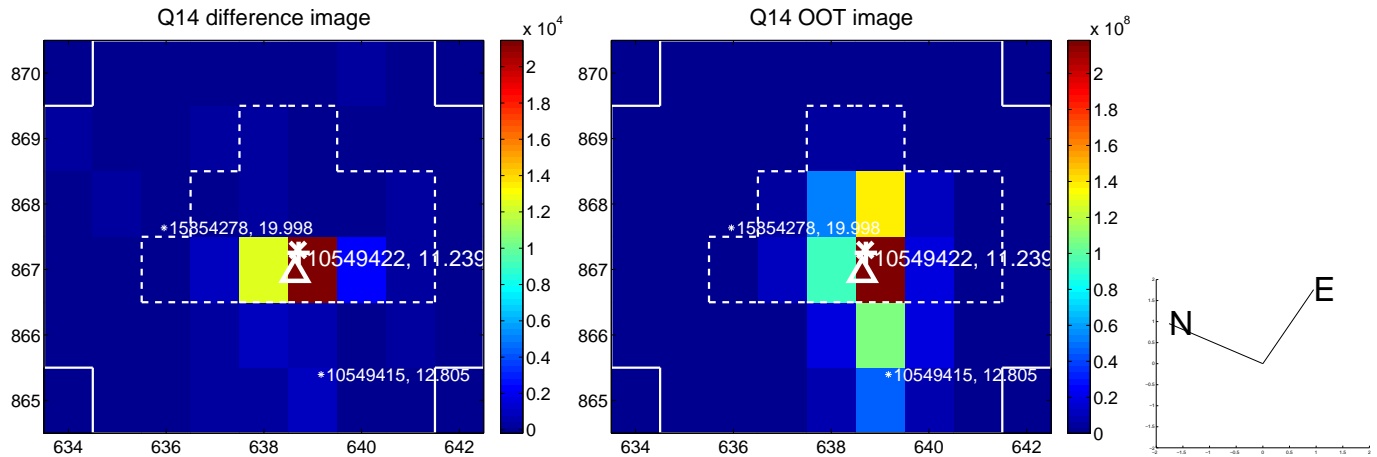
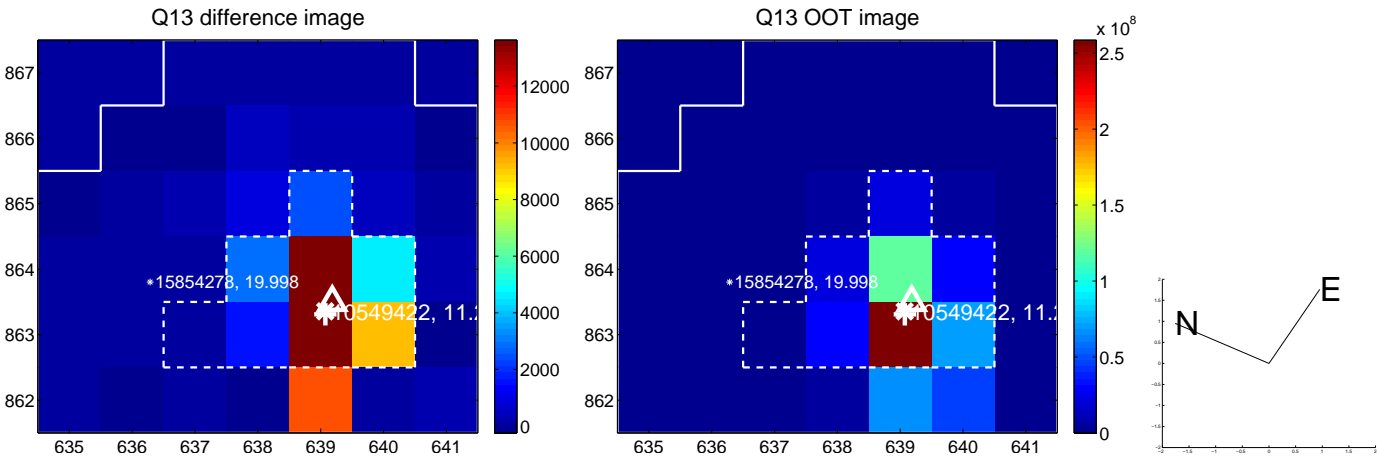




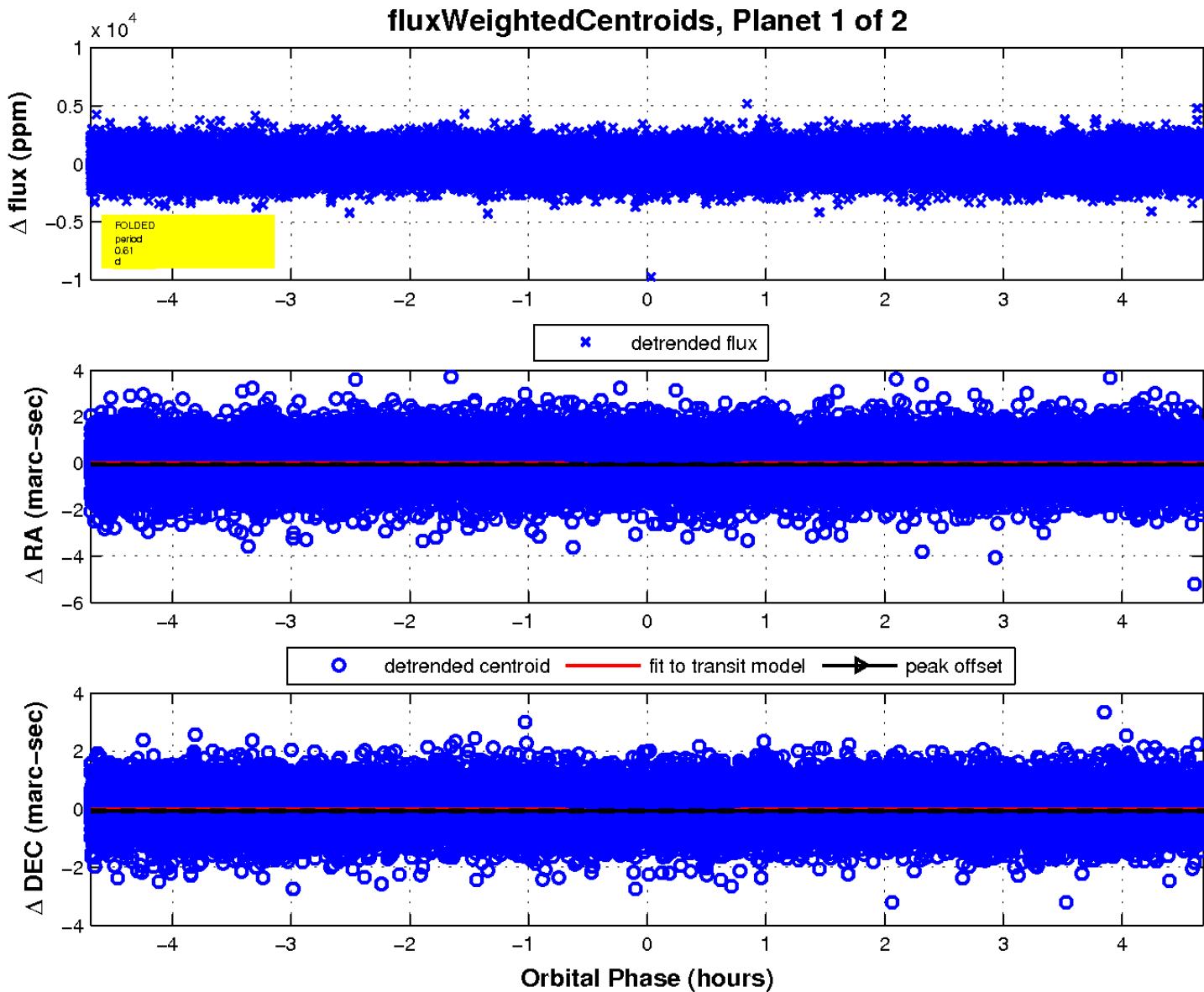
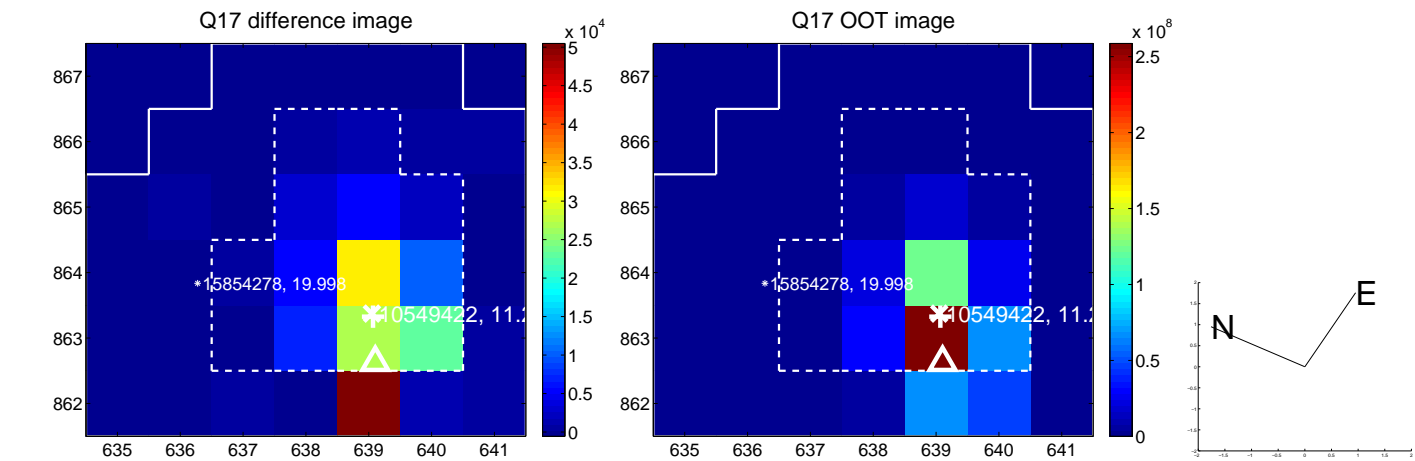
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

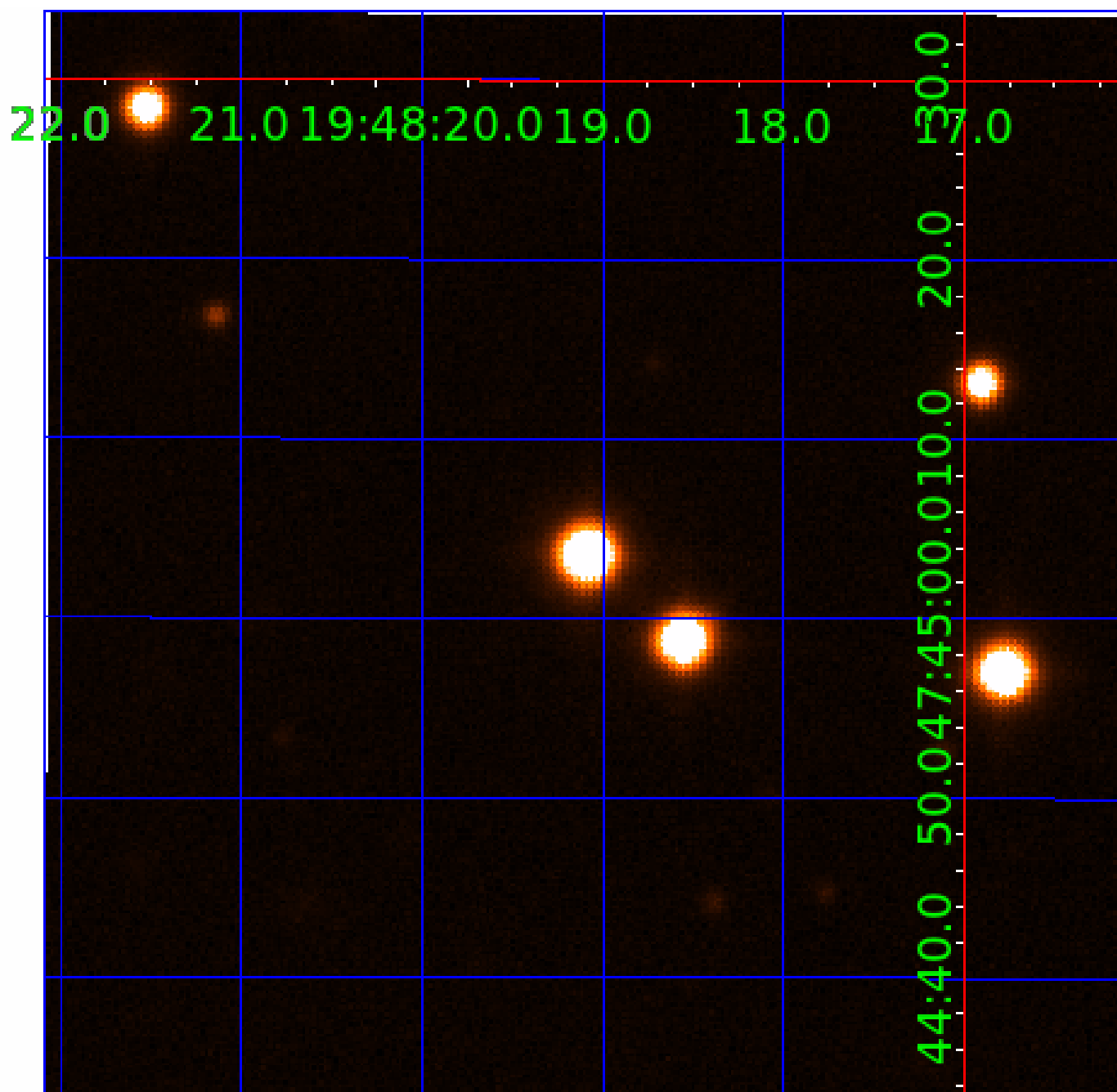


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 010549422

## Q1-17 DR25 TCE Parameters

TCE	Run Type	KOI?	Period (Days)	Epoch (BKJD)	Depth (ppm)	Duration (Hours)	MES	SNR	$R_{\star}$ ( $R_{\odot}$ )	$T_{\star}$ (K)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010549422-01	OBS	No	0.606385	132.038414	159.4	1.563	10.0	11.3	2.33	8584	3.43	80694.98
010549422-02	OBS	No	0.718642	131.545390	130.6	6.460	8.1	13.0	2.33	8584	2.77	64341.95

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010549422-01	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_NONUNIQ_ALT—CENT_SATURATED
010549422-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_RUBBLE_SKYE_ZUMA—LPP_DV—LPP_ALT—MOD_NONUNIQ_ALT—CENT_SATURATED

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

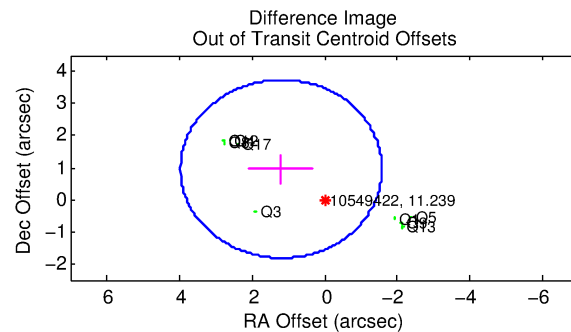
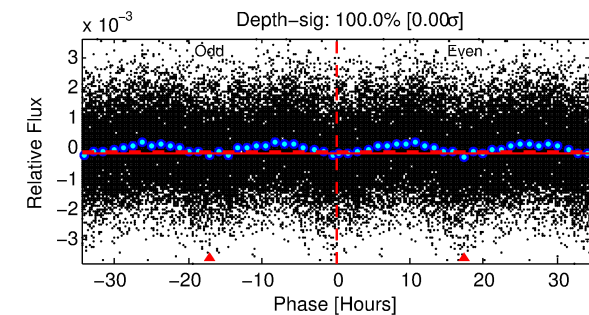
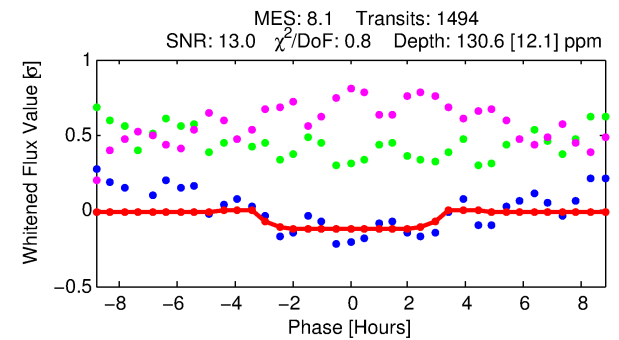
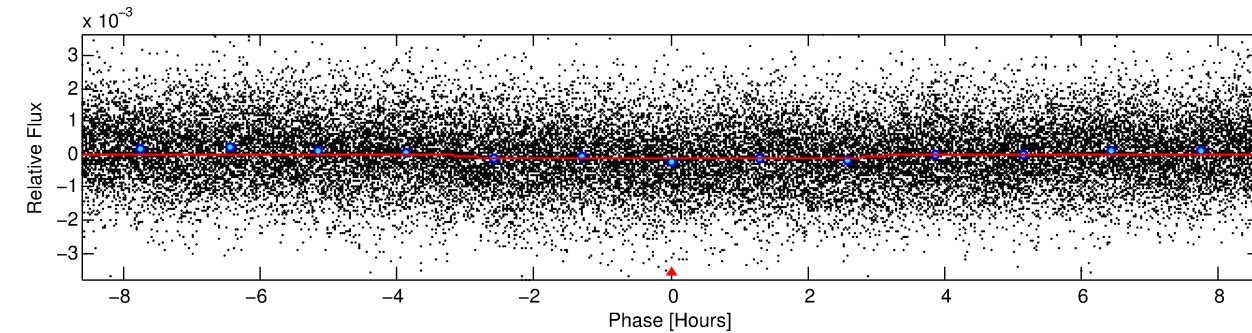
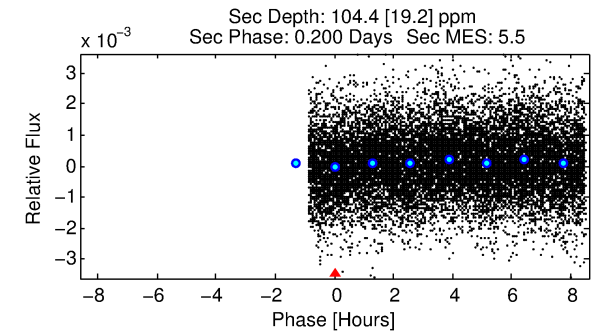
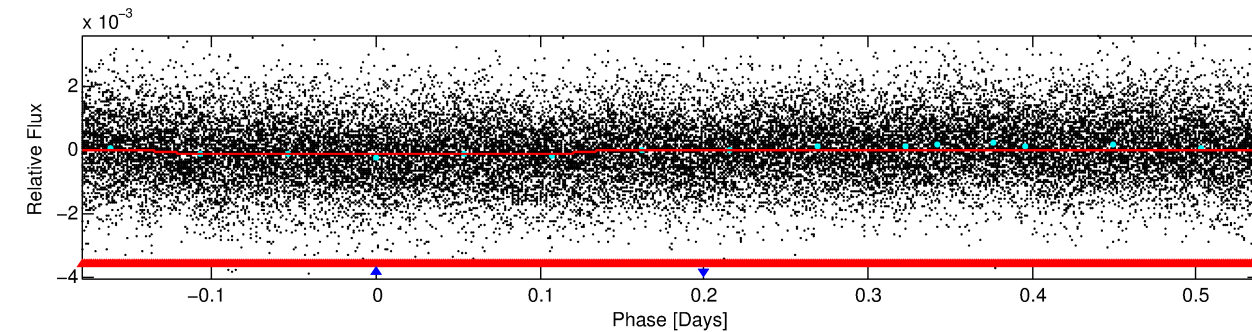
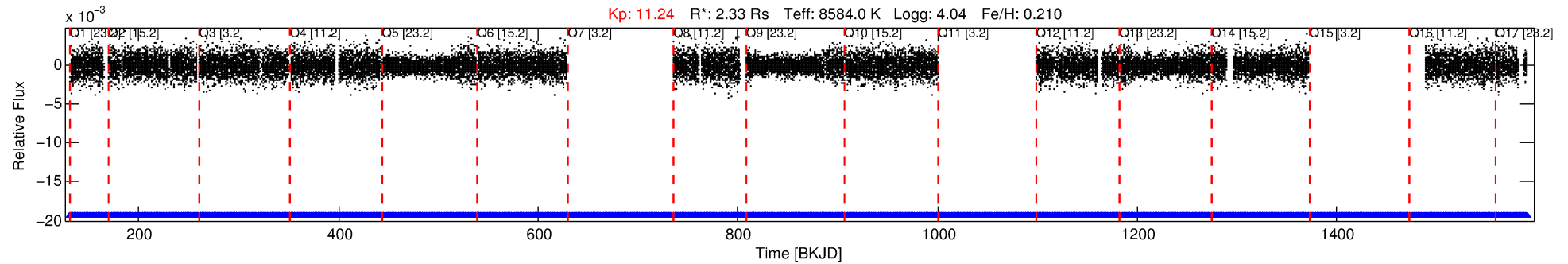
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010549422-02

No Significant Match Found

# DV One-Page Summary

KIC: 10549422 Candidate: 2 of 2 Period: 0.719 d



## DV Fit Results:

Period = 0.71864 [0.00001] d  
Epoch = 131.5454 [0.0049] BKJD  
Rp/R\* = 0.0109 [0.0080]  
a/R\* = 1.08 [0.64]  
b = 0.49 [7.01]  
Seff = 64341.95 [27410.83]  
Teq = 4061 [433] K  
Rp = 2.77 [2.24] Re  
a = 0.0203 [0.0056] AU  
Ag = 3.09 [4.70] [0.44σ]  
Teffp = 8322 [3095] K [1.36σ]

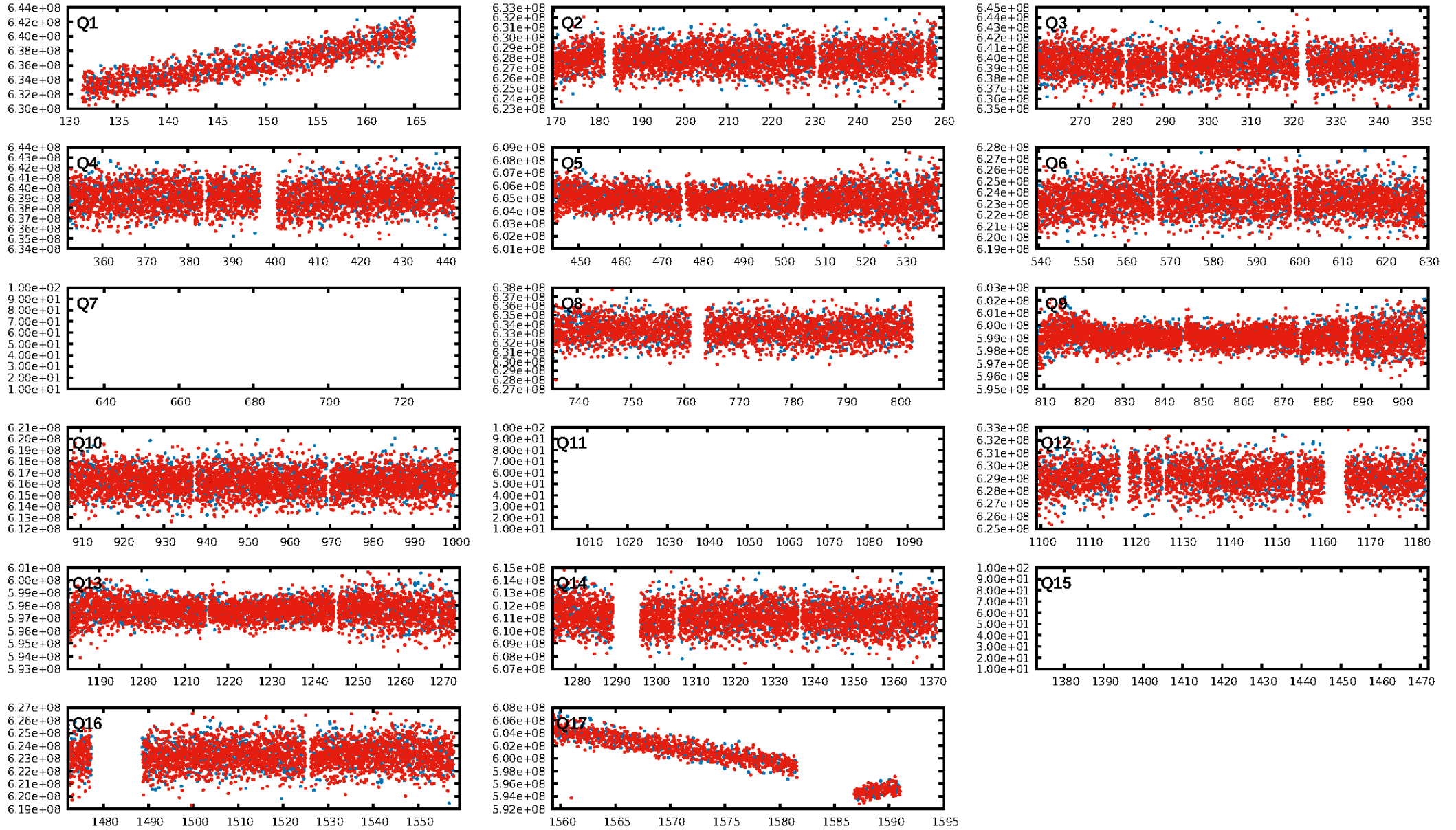
## DV Diagnostic Results:

ShortPeriod-sig: 31.5% [0.41σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [1410/1410]  
GhostDiagnostic-chr: 1.389  
Centroid-sig: 0.0%  
Centroid-so: 0.304 arcsec [2.40σ]  
OotOffset-rm: 1.532 arcsec [1.66σ]  
KicOffset-rm: 0.915 arcsec [1.24σ]  
OotOffset-st: 0/1/3/5 [9]  
KicOffset-st: 0/1/3/5 [9]  
DiffImageQuality-fgm: 1.00 [9/9]  
DiffImageOverlap-fno: 0.00 [0/14]

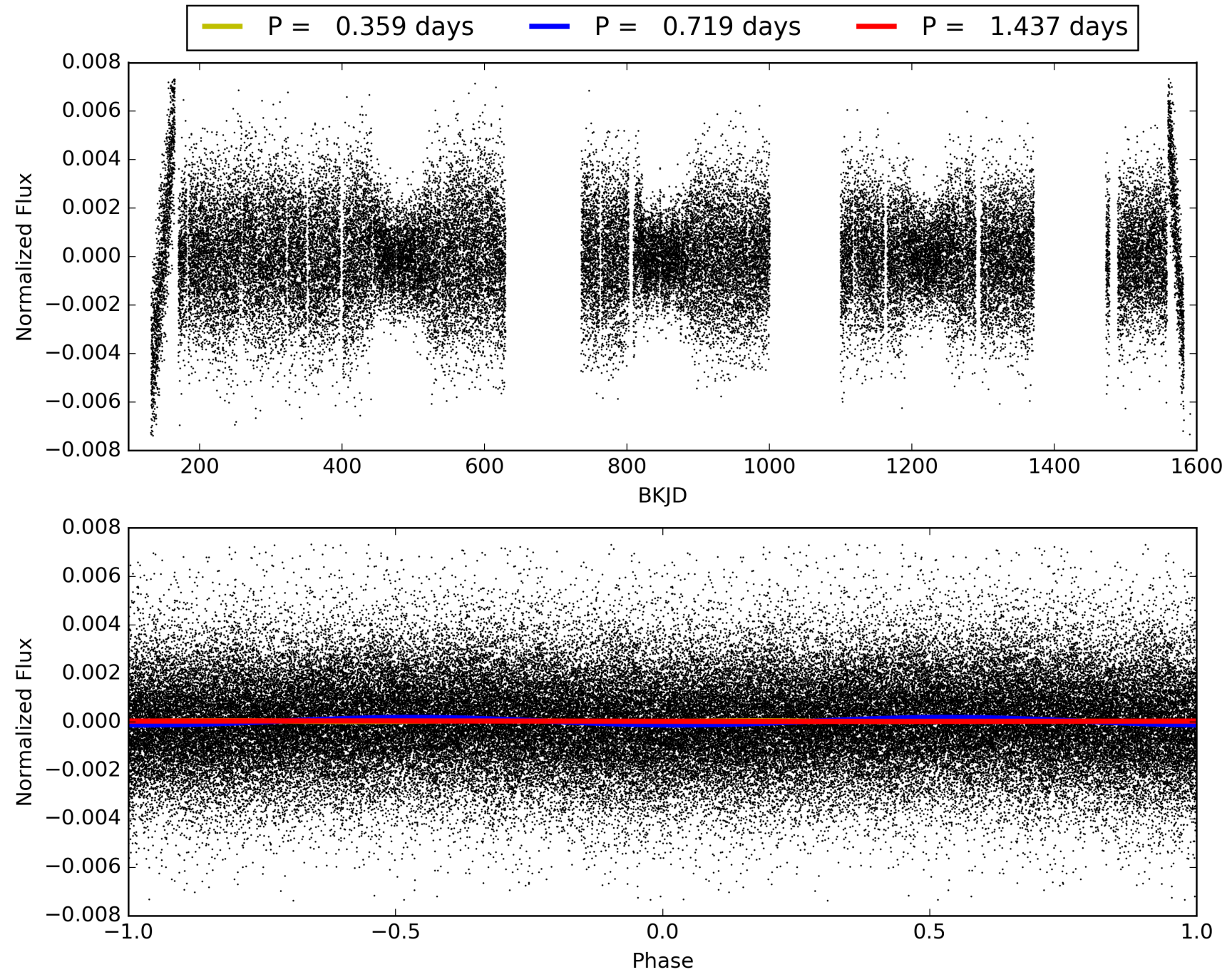
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010549422-02, PDC Light Curves



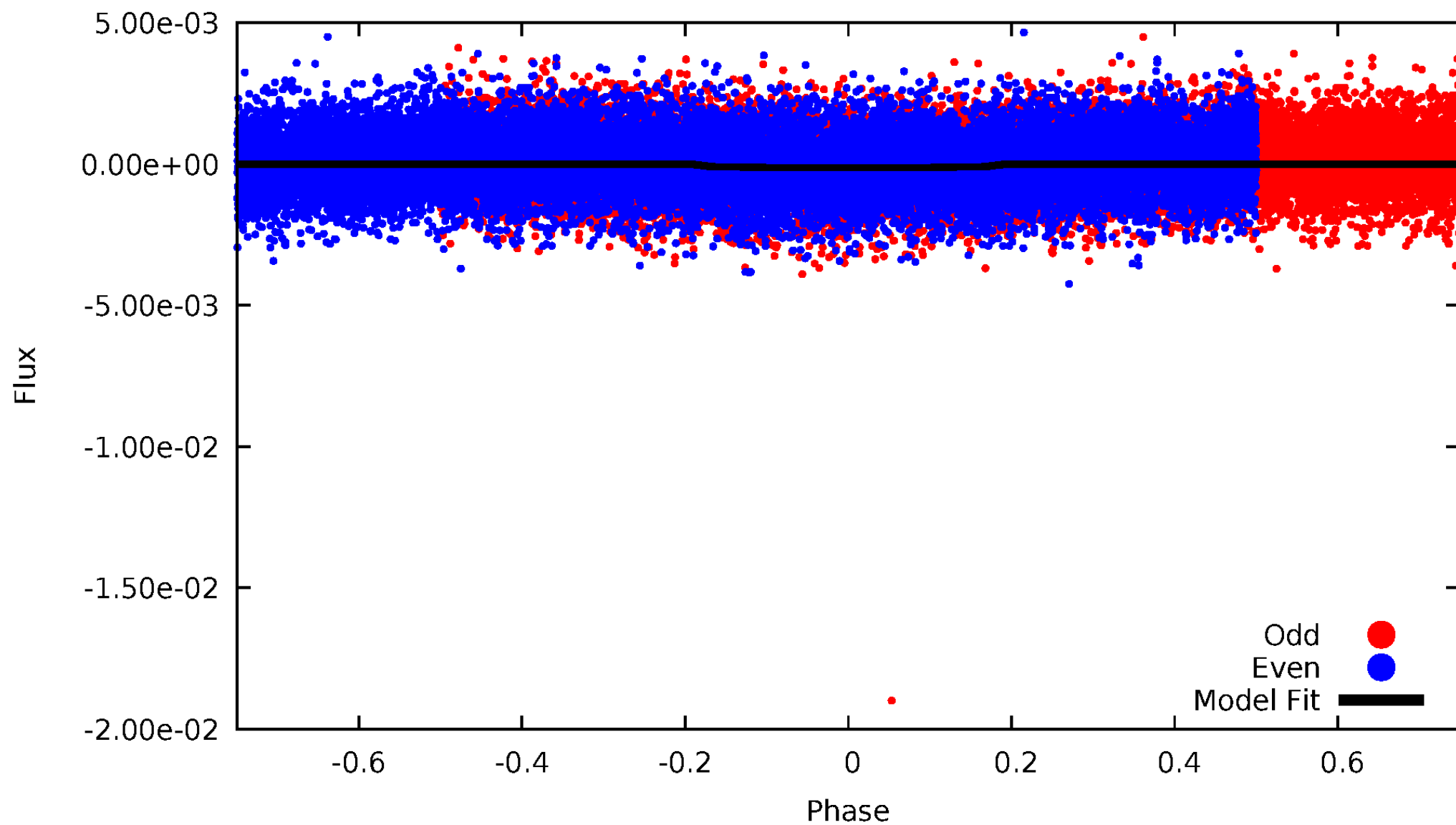
# TCE 010549422-02





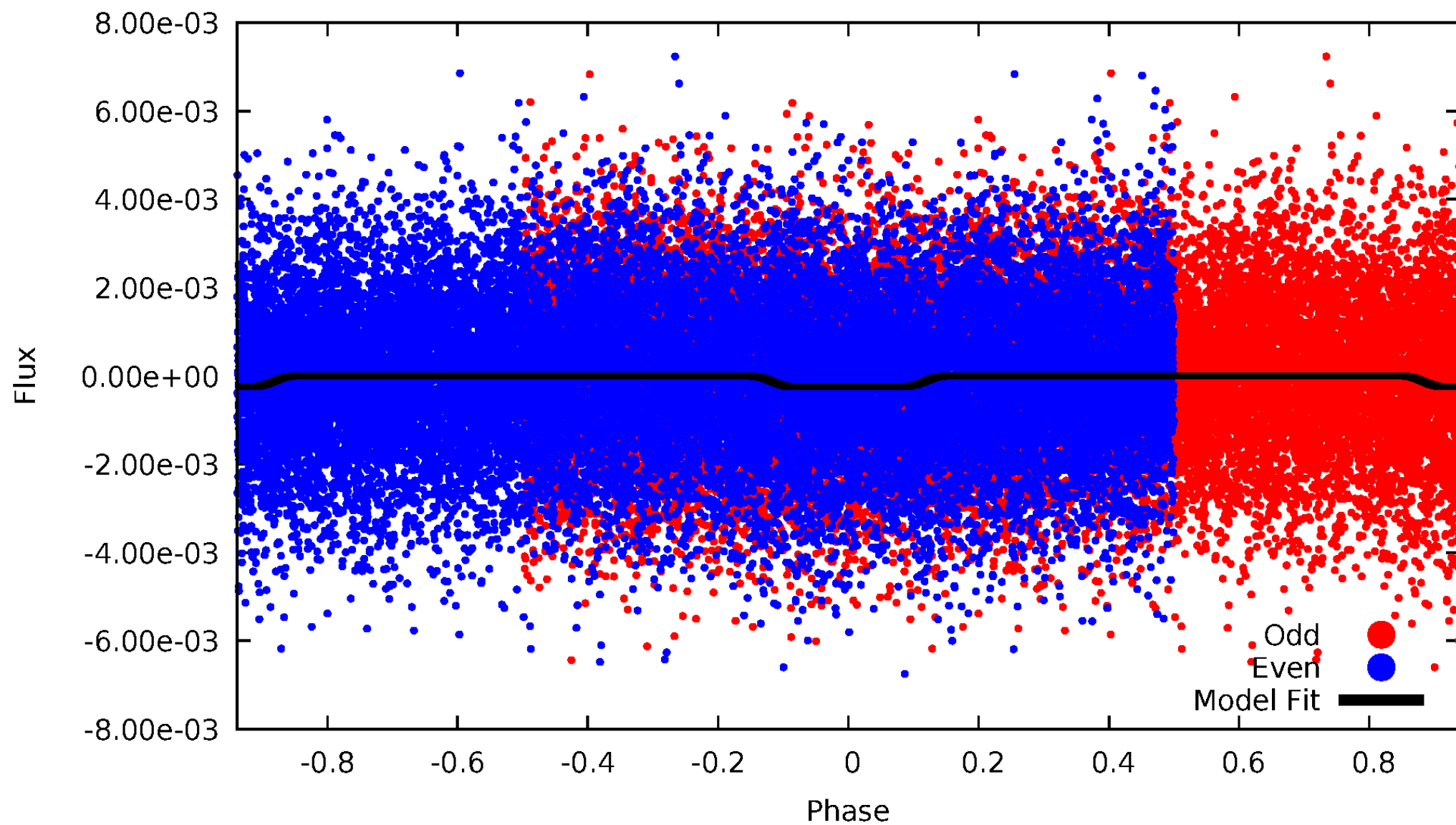
# DV Odd/Even

TCE 010549422-02



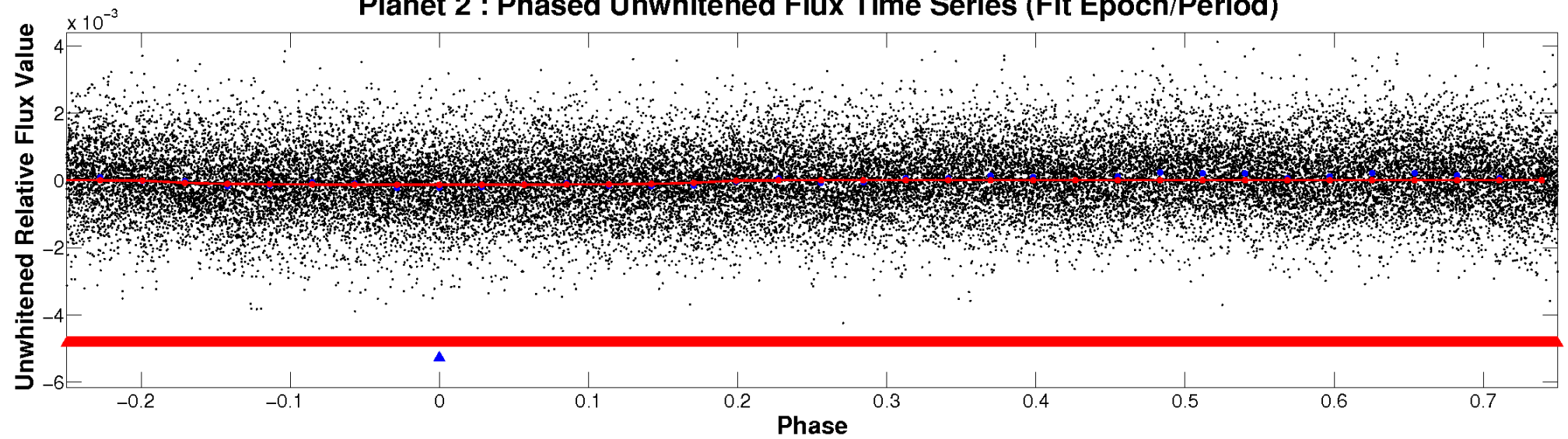
# ALT Odd/Even

TCE 010549422-02

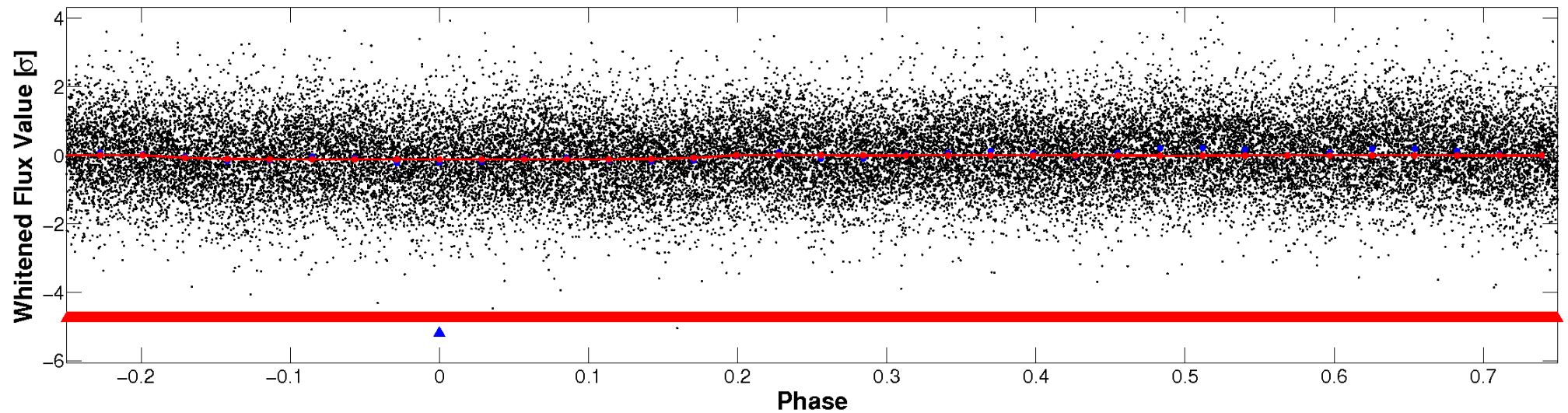


# Non-Whitened Vs. Whitened Light Curve

## Planet 2 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

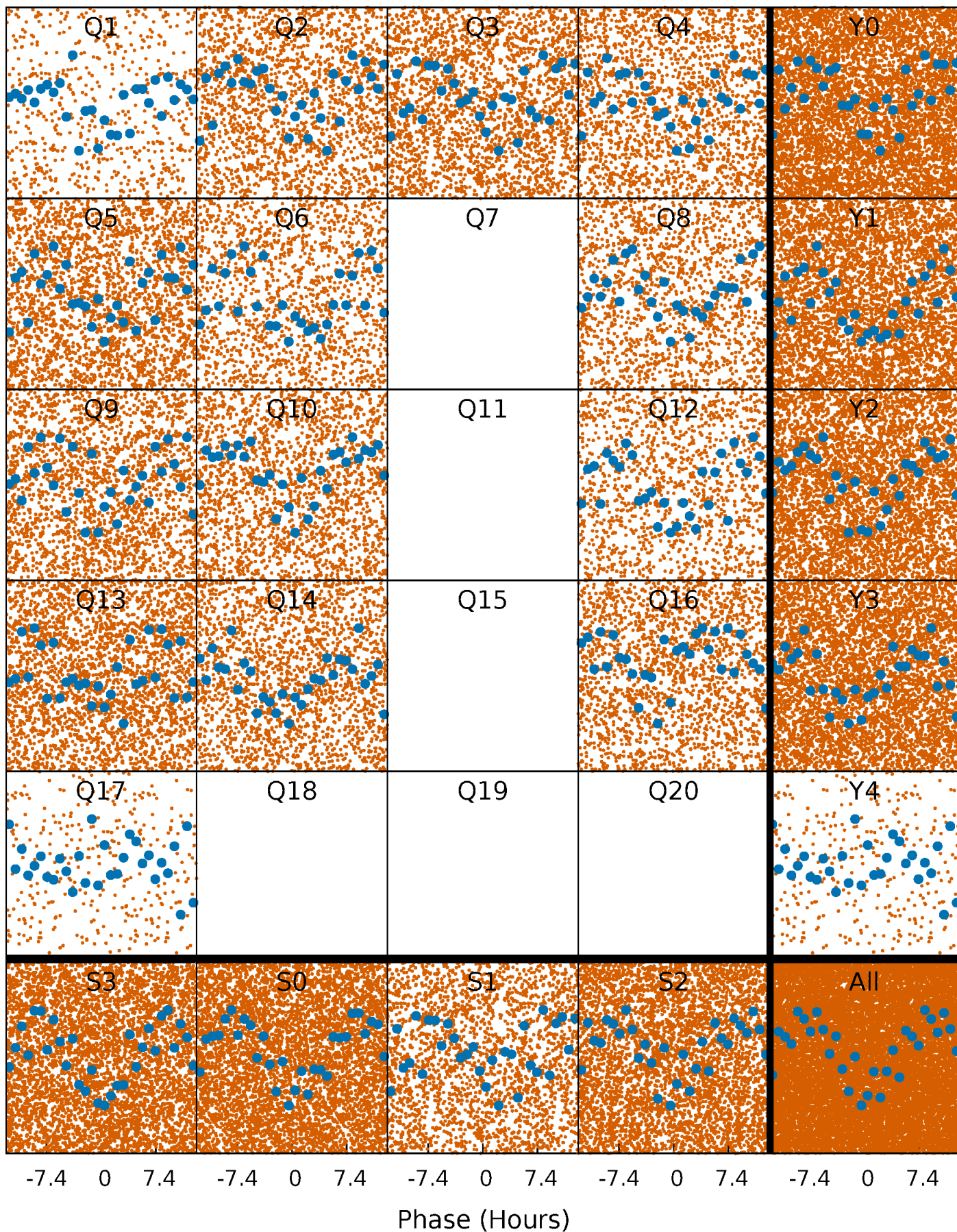


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

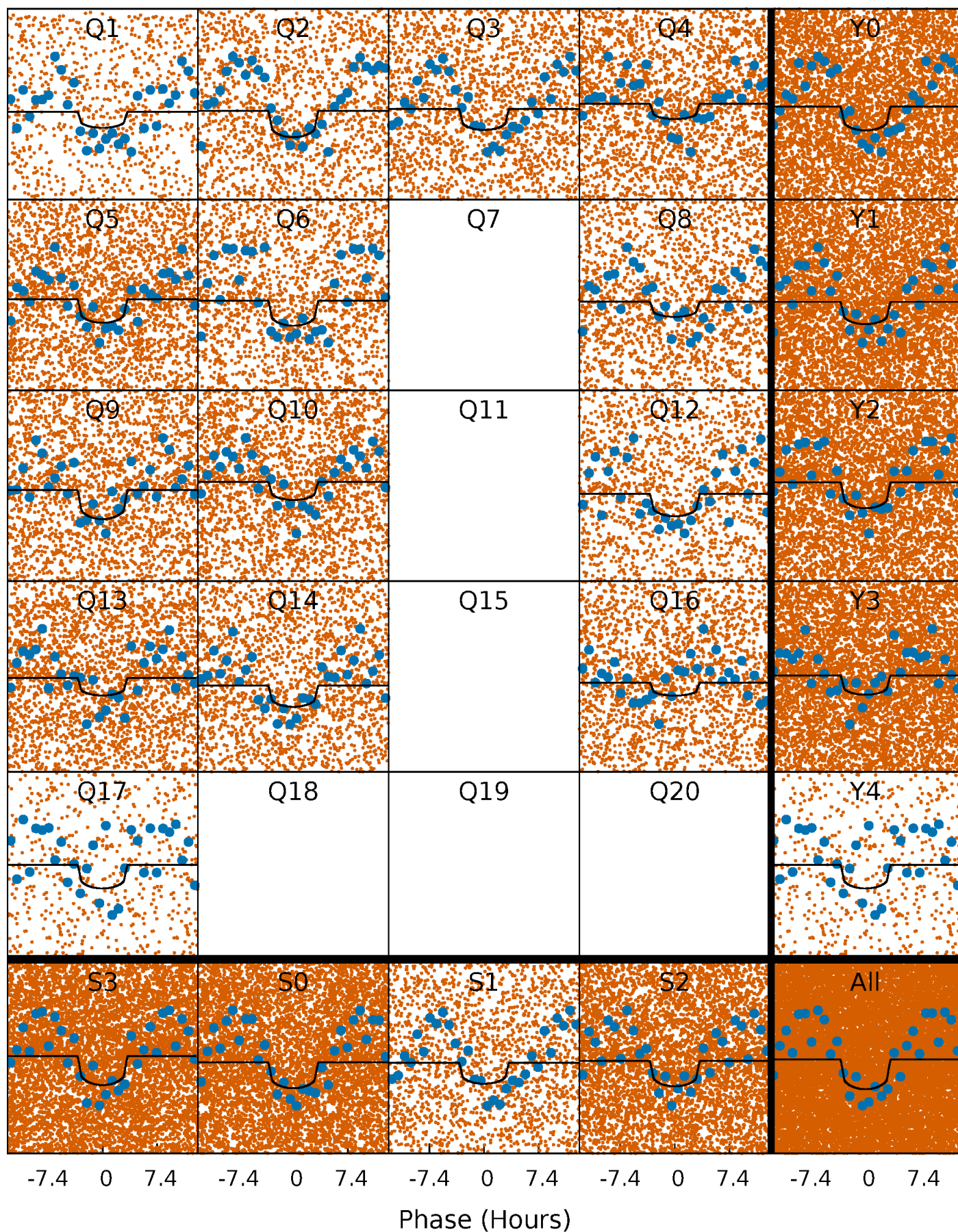
TCE 010549422-02 P= 0.718642 Days  $T_0=131.545390$  (BKJD)





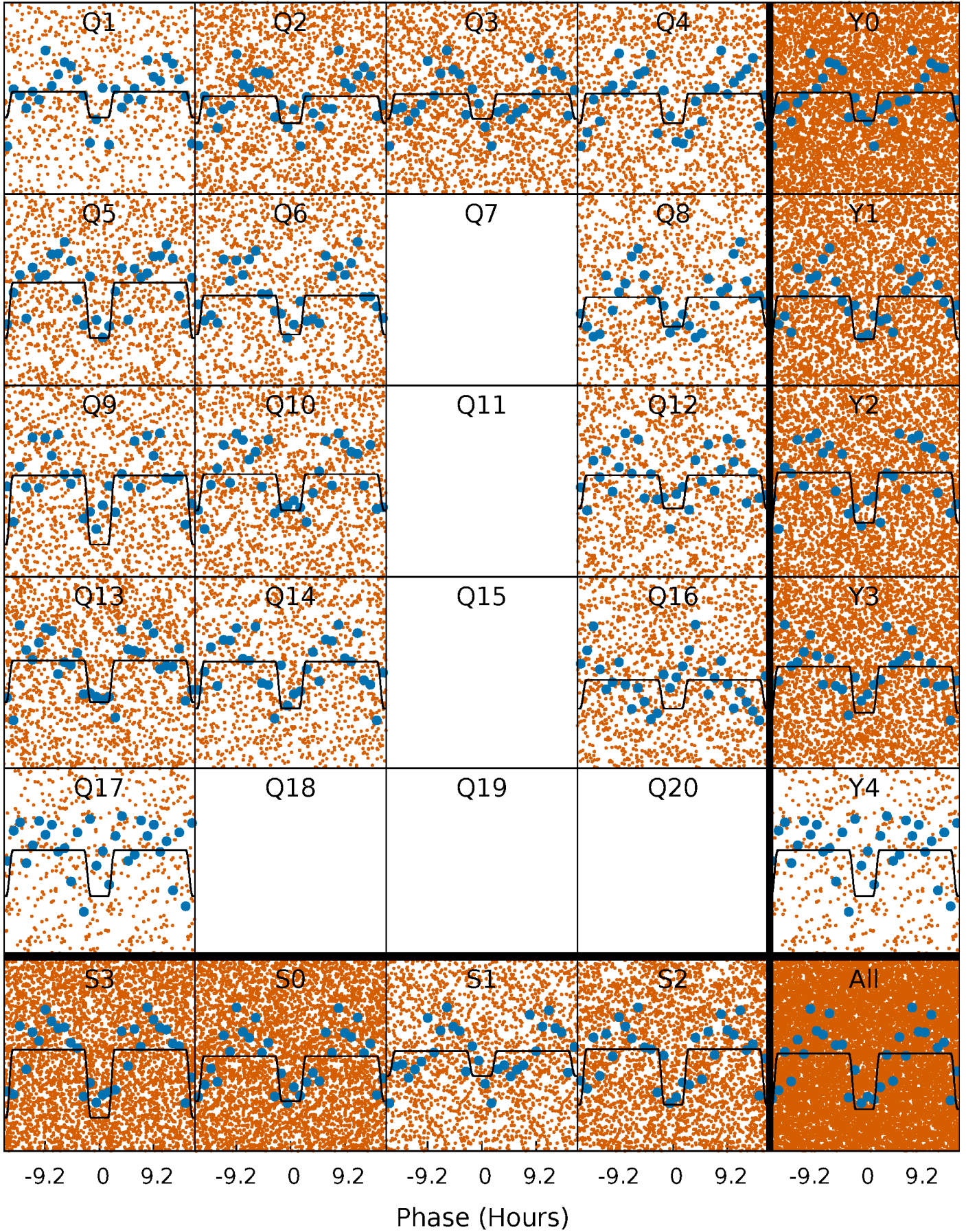
# DV Quarter-Phased Transit Curves

TCE 010549422-02 P= 0.718642 Days  $T_0=131.545390$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

TCE 010549422-02   P= 0.718652 Days    $T_0=131.541327$  (BKJD)

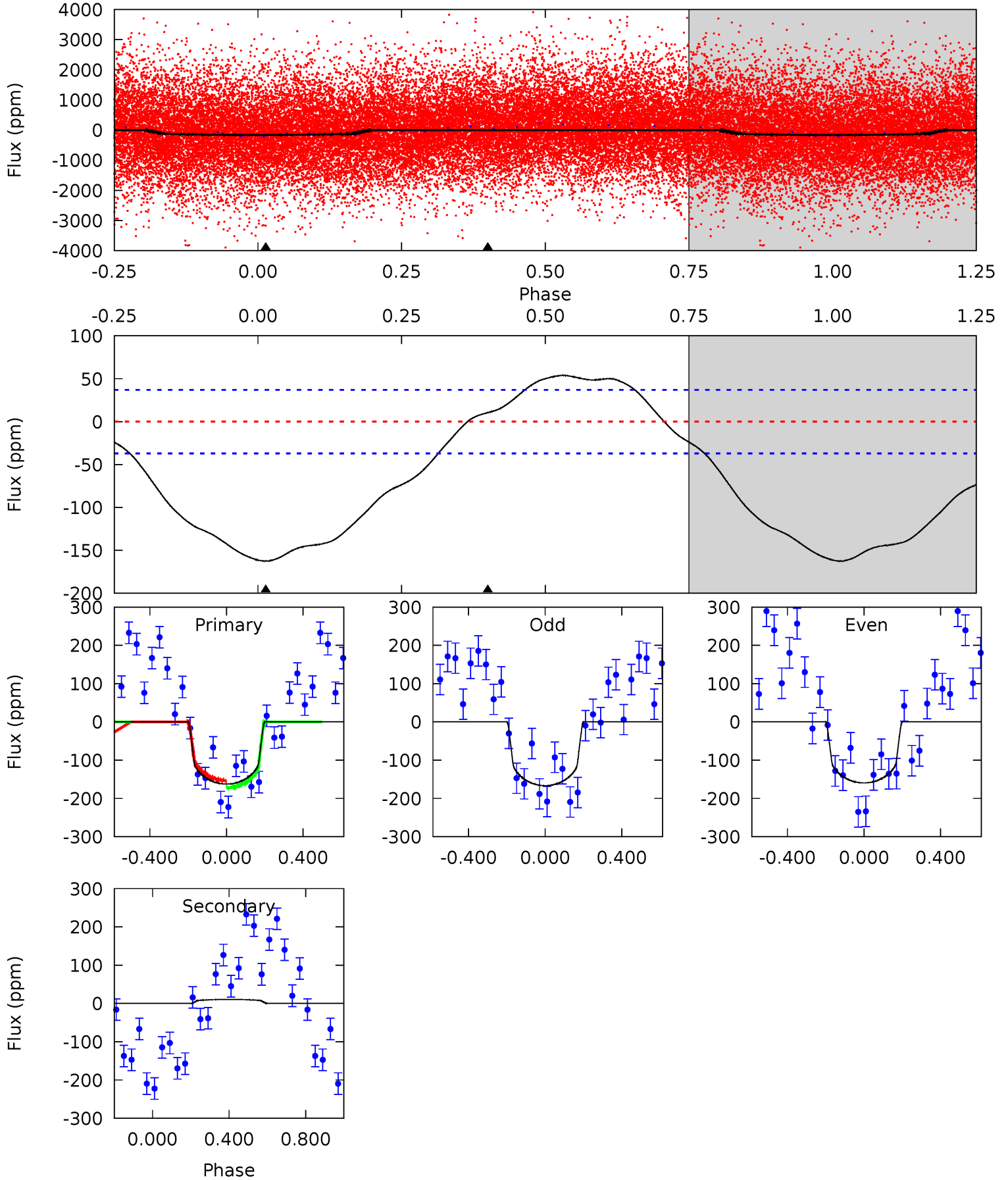




# DV Model-Shift Uniqueness Test

010549422-02,  $P = 0.718642$  Days,  $E = 131.545390$  Days

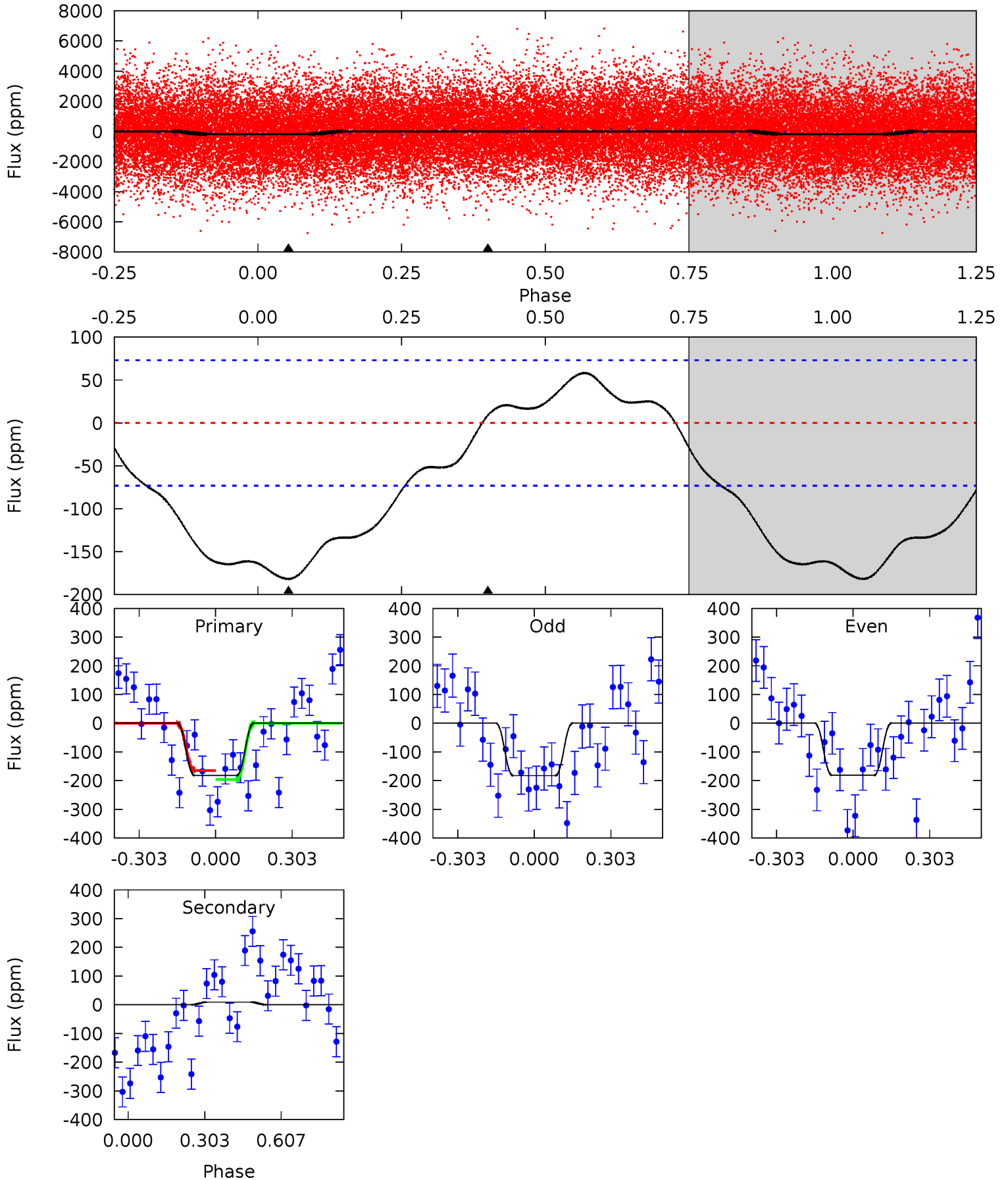
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
18.7	-1.21	0	0	4.26	0.84	2.25	18.7	18.7	-1.21	-1.21	0.41	1.10	0.25	1.08



# Alt Model-Shift Uniqueness Test

010549422-02, P = 0.718652 Days, E = 131.541327 Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.8	-0.54	0	0	4.33	1.03	1.59	10.8	10.8	-0.54	-0.54	0.04	1.36	0.24	0.94



### Stellar Parameters For KIC 010549422

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$8584^{+240}_{-411}$	$4.036^{+0.148}_{-0.198}$	$0.210^{+0.150}_{-0.550}$	$2.335^{+0.802}_{-0.535}$	$2.159^{+0.330}_{-0.454}$	$0.239^{+0.190}_{-0.121}$
	+3%/-5%	+4%/-5%	+71%/-262%	+34%/-23%	+15%/-21%	+80%/-51%
Source	PHO54	PHO54	PHO54	DSEP		

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 010549422-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$10 \pm 9$	$2.83^{+2.24}_{-1.71}$	$5673^{+431}_{-423}$	$-5289^{+593}_{-1878}$	$-0.237^{+0.211}_{-1.385}$
Alt.	$9 \pm 17$	$4.11^{+2.26}_{-2.01}$	$5688^{+467}_{-417}$	$-4958^{+728}_{-829}$	$-0.095^{+0.196}_{-0.391}$

$T_{max}$  = Theoretical Maximum Planetary Temperature

$T_{obs}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{obs}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{obs} \gg T_{max}$  AND  $A_{obs} \gg 1.0$

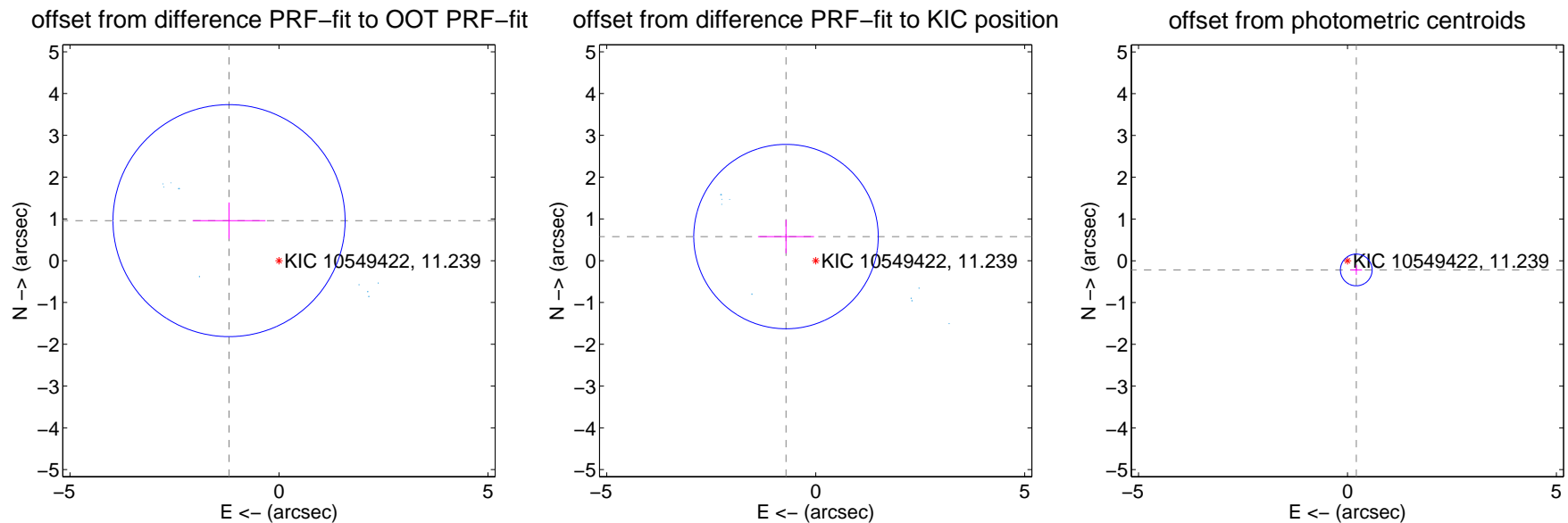
## DV Centroid Data

Supplemental centroid analysis for 010549422-02. **Kepler magnitude: 11.24.** Transit SNR 12.99

There are 9 quarters with good PRF difference image offsets

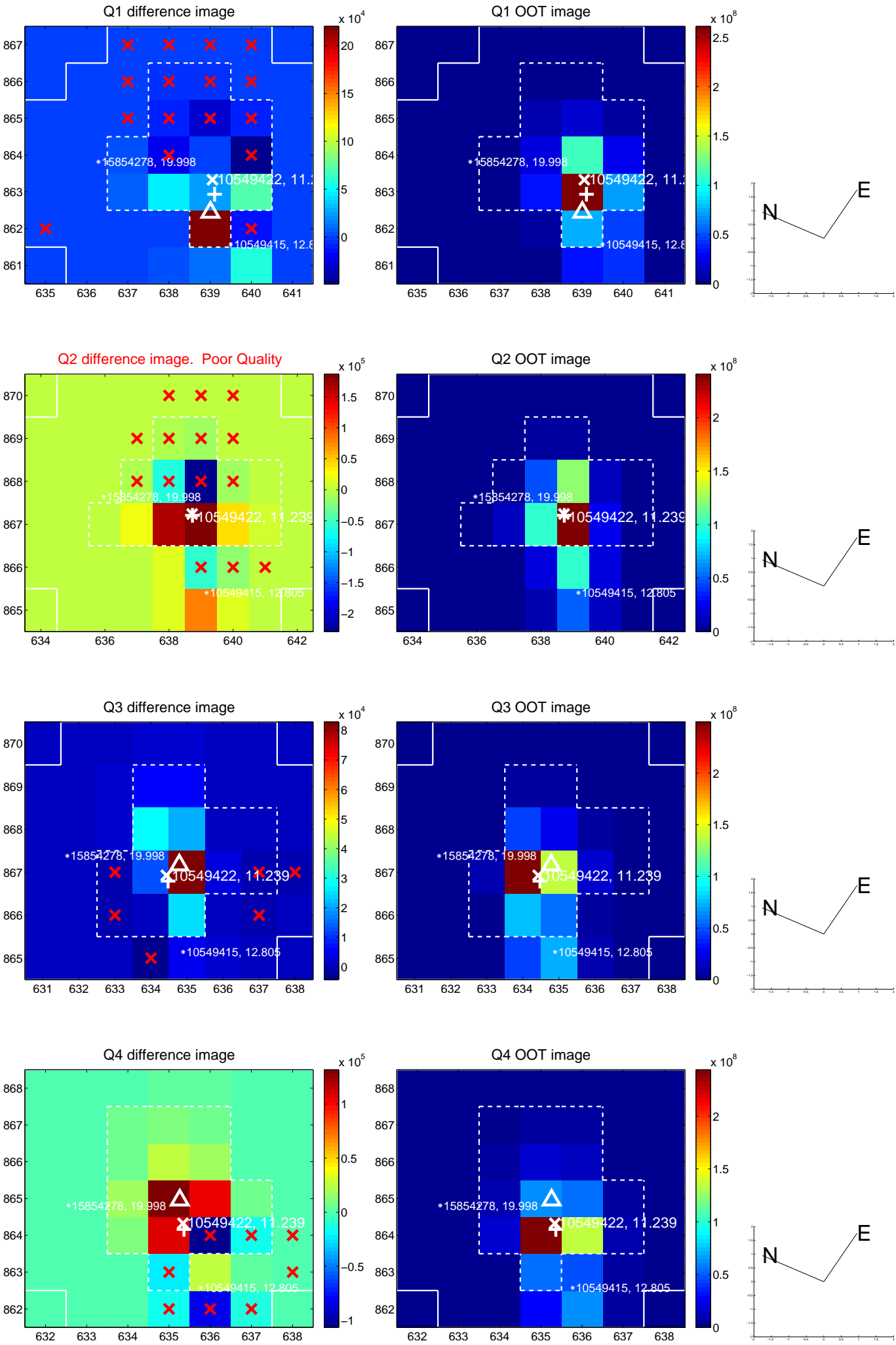
The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.532 \pm 0.925$	1.66	$1.195 \pm 0.870$	$0.959 \pm 0.435$
PRF-fit source offset from KIC position	$0.915 \pm 0.735$	1.24	$0.711 \pm 0.669$	$0.577 \pm 0.399$
photometric centroid source offset	$0.30 \pm 0.13$	2.40	$-0.21 \pm 0.14$	$-0.22 \pm 0.12$

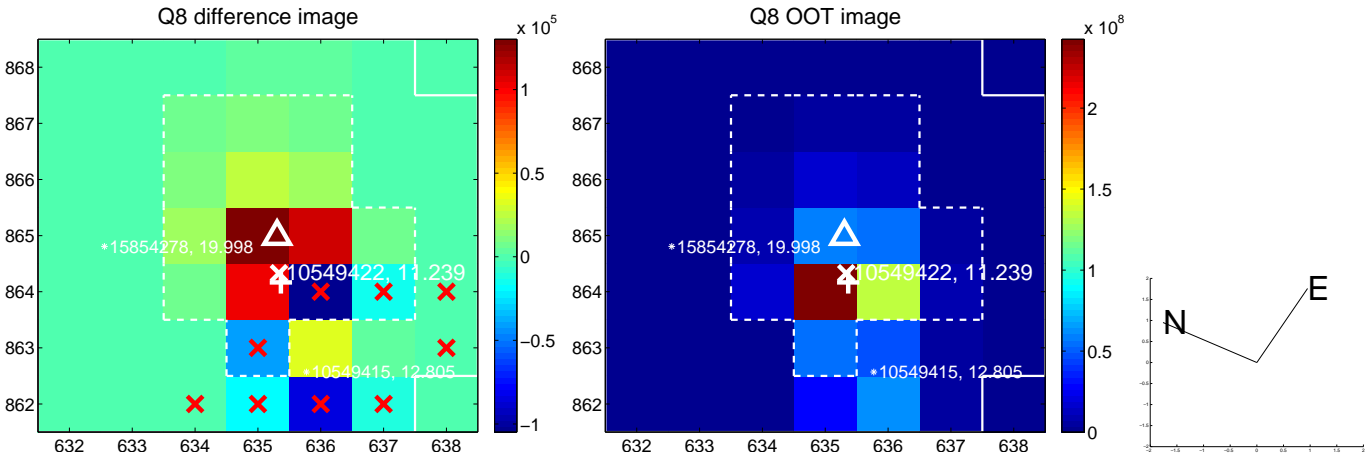
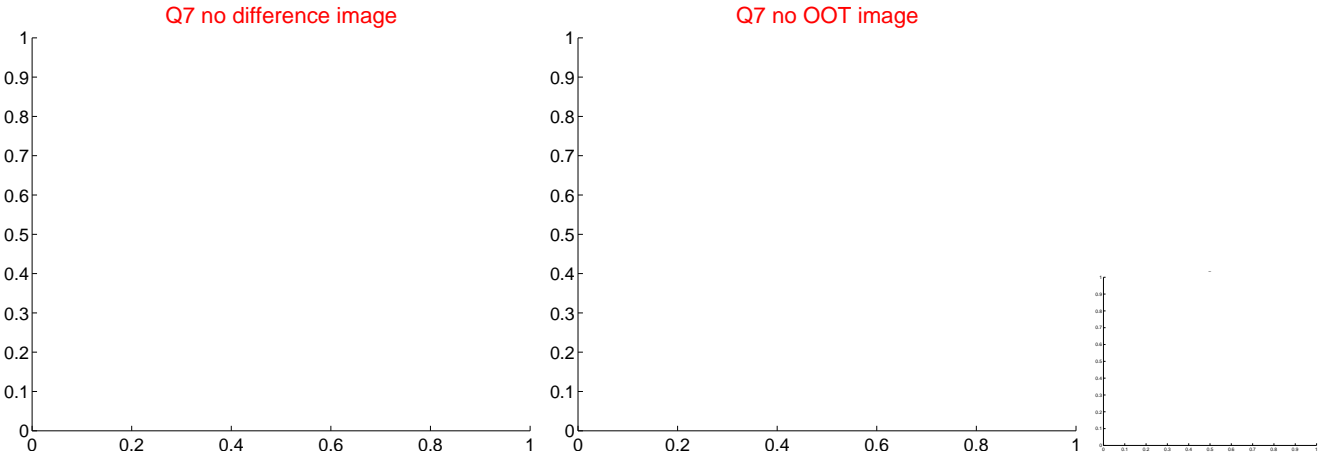
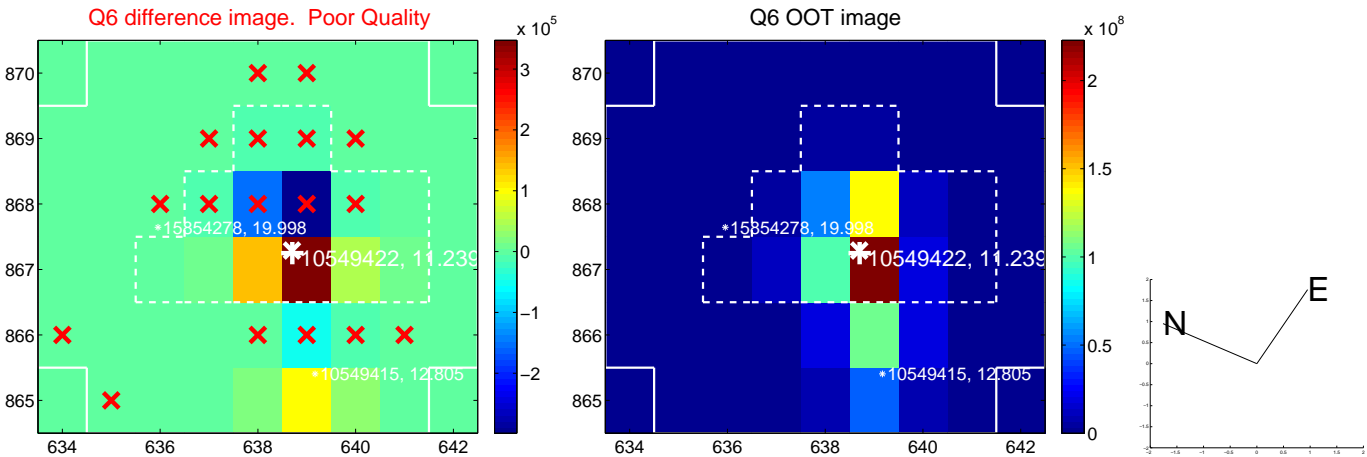
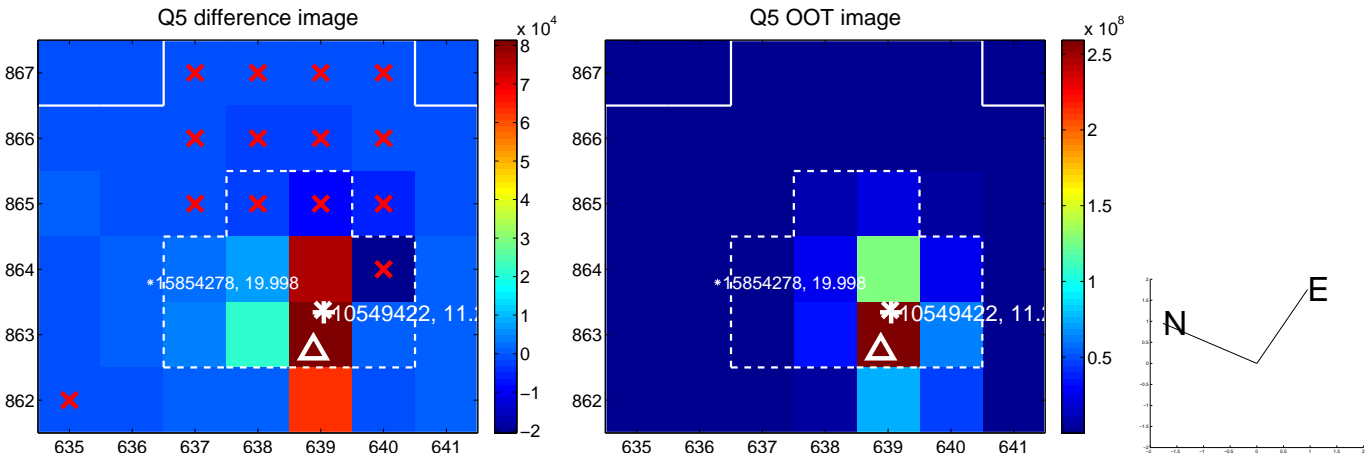


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

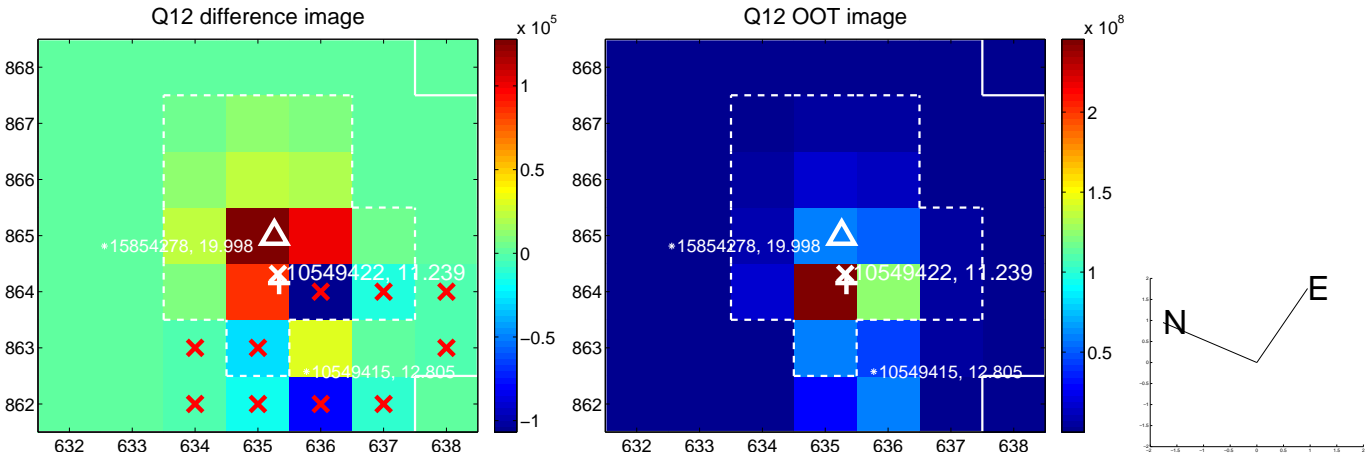
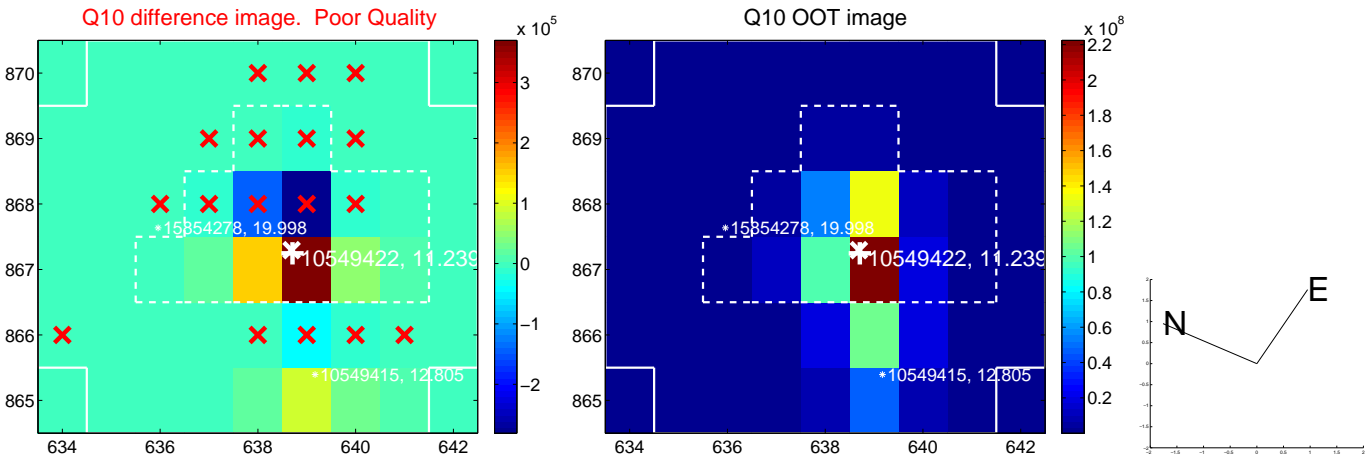
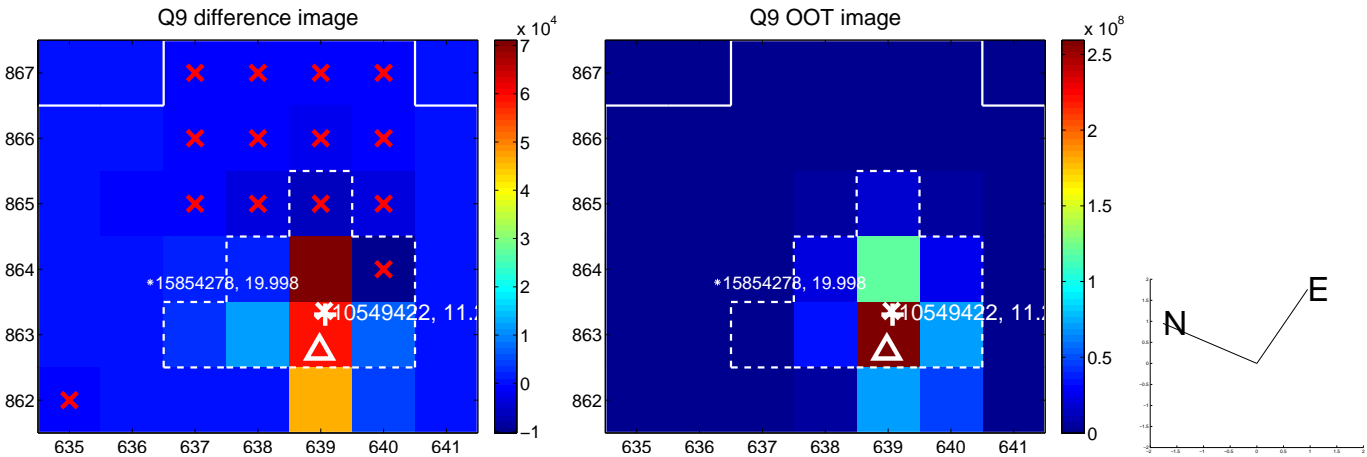


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

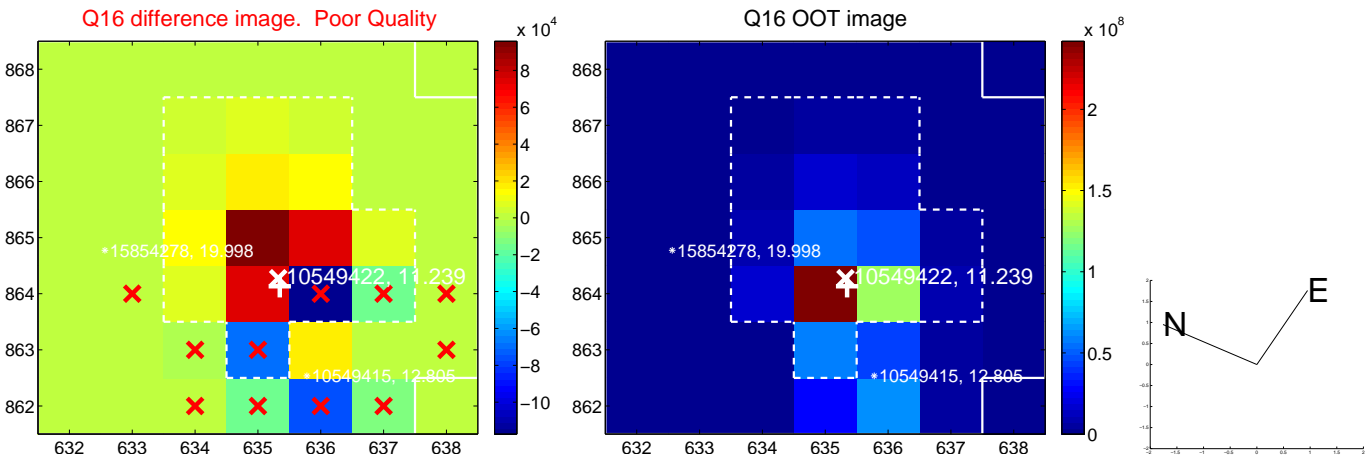
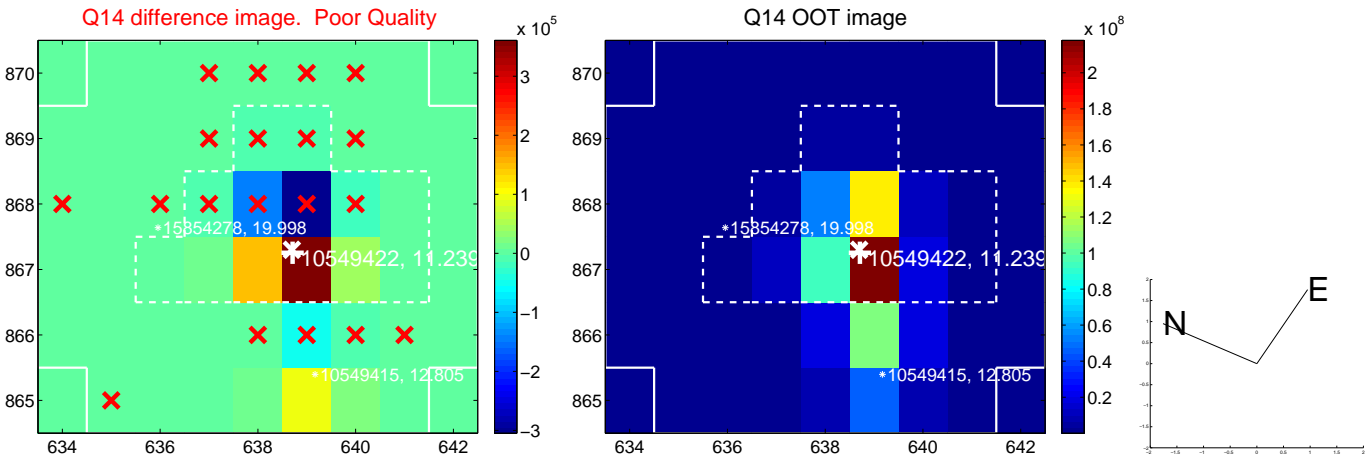
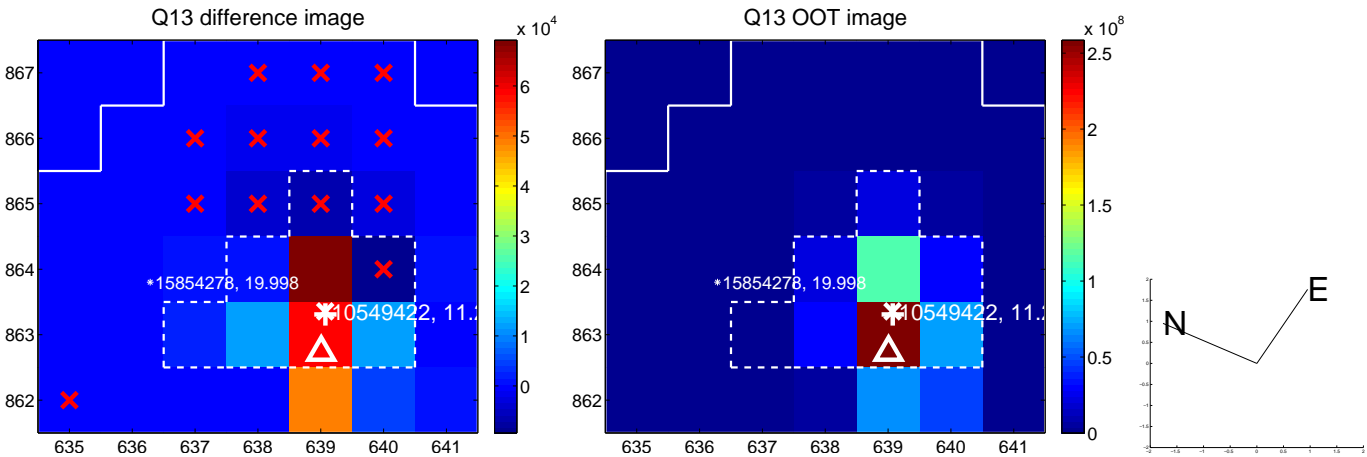




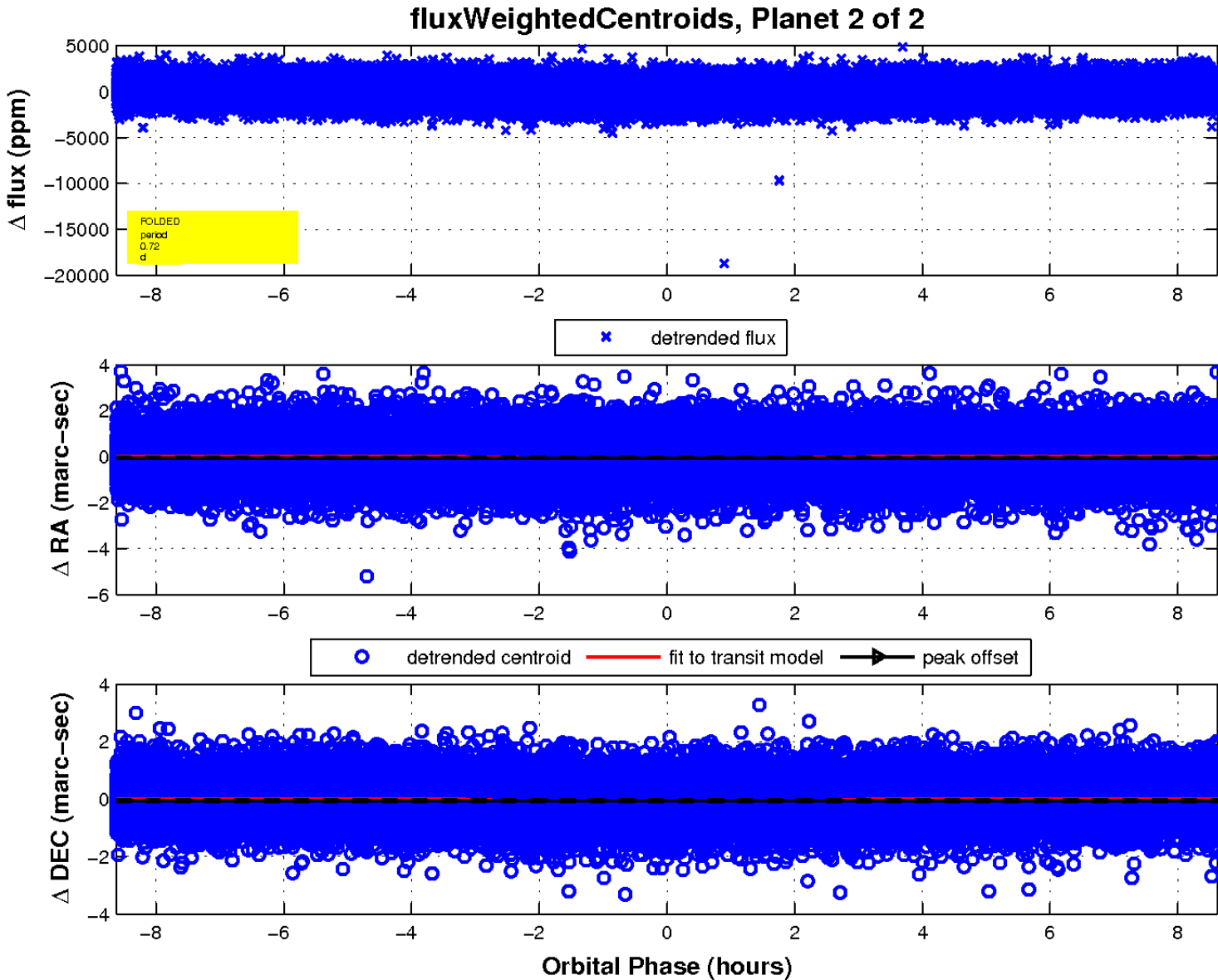
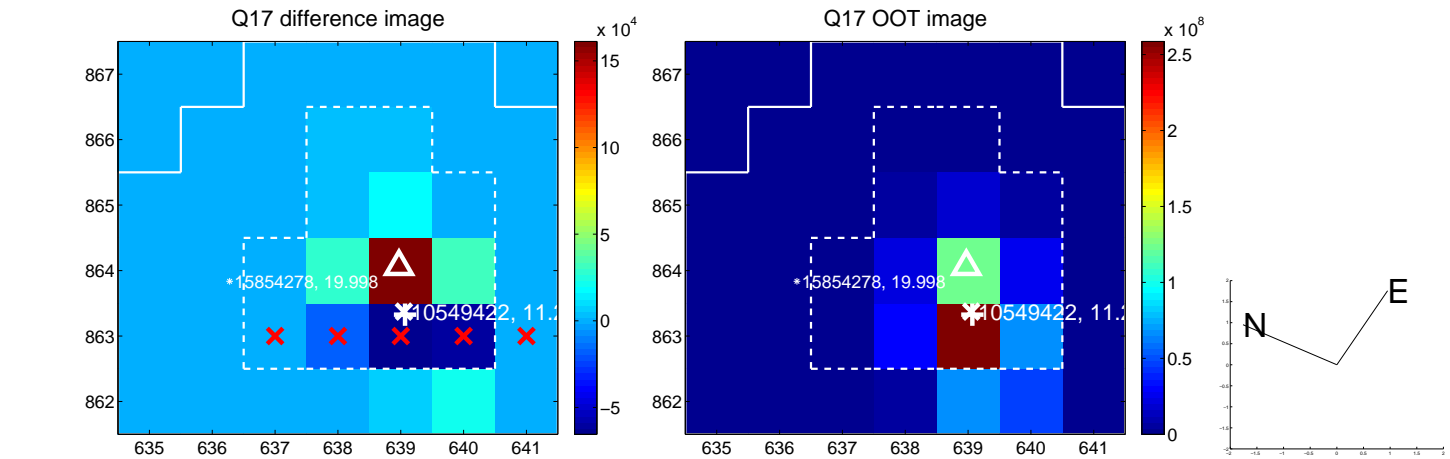
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UKIRT Image

Declination

